MuTEX
User's Guide

(Version 1.1)

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29 August 1989

Contents

Preface

The MuTEX[1] package is a set of macros allowing TEX[2] to typeset beautiful music. It is the outcome of a Master's thesis at the Rheinische Friedrich-Wilhelms University:

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MuTEX can handle single-staff music with one or two voices. It can also put text below the staff, and knows about most accents that go above notes, or simply above the staff. However, it cannot deal with multiple-staffs, or with notes of variable size.

The files initially available were:

`mtex.tex`	The set of macros for TEX.
`mtexdemo.tex`	A demo in TEX.
`mtexinfo.tex`	A list of macros available.

I immediately saw the potential of this system which happened to answer exactly my modest needs. Unfortunately, the brief document in german enumerating the available macros was the only documentation available. Craig D. Rice from St. Olaf College (`cdr@stolaf.edu`) kindly translated it to english. However, I felt the need for a more complete user's guide still remained unanswered, and so I volunteered to give it a try. In addition, setting up MuTEX turned out to be tricky for a novice like me. I would like to help others avoid making the mistakes I made.

[1] © 1986,1987 by Andrea Steinbach and Angelika Schofer.
[2] Trademark of the American Mathematical Society.

I decided to refer to the system as MuTeX, which I find appropriate. I hope nobody will mind. Since MuTeX is a copyrighted product, I feel I am not legally entitled to modify it. All my attemps at locating the authors by electronic mail have failed. Consequently, even though Appendix C lists several errors I already have found in MuTeX, you still will have to modify MuTeX yourself, if you feel like doing so. Fortunately, this shouldn't take too long. It may be possible in the near future to supply you with some tools performing the changes automatically.

The current version is only 0.92 and one can wonder if a version 1.0 ever saw the light of day. This is even more possible as the original demo presents a system which seems to involve a preprocessor of some sort. This preprocessor would help relax the rather strict rules that one must follow right now while using MuTeX. I would love to hear more about this. I think it is possible that the authors ran out of time, and had to cut things short near the end of their master's work. This mysterious preprocessor may very well not exist yet.

The original demo included two different pieces of music. Since this demo was not copyrighted, I felt I could indulge myself. I decided to split it into two smaller demos. I also reformatted the commands to increase legibility. Finally, I removed the german text which illustrated how the music would have been entered with the preprocessor. More on the files included with this guide can be found in Appendix D.

So here is my modest contribution. I decided to use LaTeX[3] with which I am somewhat familiar. I consider this guide supersedes Craig's original translation effort, and this is why I decided not to include his english translation of the german information file in this package. I hope he won't mind. To produce this guide, run LaTeX three times on the file `guide.tex`, this to fully resolve cross-references.

If you plan on making this package available for FTP at your site, I would appreciate you letting me know your coordinates and the path to be used for retrieving MuTeX. I plan on keeping updating the list of these sites in the forthcoming versions of this guide. I could also add a list of people, and their electronic mail address, who use MuTeX regularly and are willing to lend a helping hand. Here are the initial two FTP sites. I am told that `stolaf.edu` is only two hops off the NSFNet backbone while `cs.ubc.ca` is a rather slow

[3]Trademark of Addison-Wesley Publishing Company.

site.

```
cs.ubc.ca    128.189.97.5  /pub/src/MuTeX
stolaf.edu   130.71.128.1  /pub
```

There is still a lot I do not understand about TEX, and I apologize in advance for my errors. If you have any comments, suggestions, additions, etc, don't hesitate to contact the author (`jalbert@cs.ubc.ca`):

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Chapter 1

Introduction

1.1 MuTEX Template

A piece of music should always be structured as in Figure 1.1. Several such music compositions are allowed within one TEX document. As is always the case with TEX, let me remind you that the last line of your input file should be `\bye`. Let's now look into the different elements making up MuTEX's template.

```
Preamble
\beginsong{Clef}{Key}%
\meter{number}/{number}%
    .  %
    .  %
    .  %
\endsong
```

Figure 1.1: Standard MuTEX Template.

1.2 Preamble

The preamble specifies information like song title, author, and spacing. The elements making up the preamble can be specified in any order, or simply be omitted.

The title appears in boldface and is centered on top of the staff:

`\title{`*text*`}`

The composer goes to the right:

`\composer{`*text*`}`

The poet to the left:

`\poet{`*text*`}`

The voice goes to the left of the first staff. A default indentation of the staff is supplied but may prove insufficient. Adjust it with `\parindent` as below:

`\parindent` *number*`pt`
`\voice{`*text*`}`

Five different overall spacings between symbols on the staff are available as shown in Figure 1.2. The spacing cannot be changed once selected. The default is `\universal`.

```
\hsmall
\small
\universal
\wide
\loose
```

Figure 1.2: Available Spacings.

A final comment concerning spacing while we're at it: even though MuTeX tries to do a good job at spacing symbols properly, you will come across an occasional unsatisfactory placement. It is possible to adjust things by introducing spaces at the right places in your input file. That is, MusiXTeX is sensitive to spaces. However, it turns out a single space in the input file usually result in too much space between consecutive symbols on the staff. You are advised to use instead the command `$\,$`. I have found it ideal for small adjustments and it is possible to use several of these in a row for larger spaces. One usually performs that kind of fine adjustment when all else has been entered and verified to be correct.

Since spaces in your input file show up as extra spaces between the music symbols being typeset, you cannot indent your input file at will to make it easier to read. In addition, it is standard for TeX to treat line changes as equivalent to a space. Does that mean you are required to enter your whole composition on one line? Fortunately not! The following two simple rules do the trick:

- Start each line exactly at the left margin.
- Terminate each line with a `%` character.

Now you understand the presence of `%` signs in Figure 1.1! Note that the preamble does not require such a special treatment. Finally, I will point out later where these strict spacing rules can be relaxed. The examples of Appendix A carefully obey these spacing requirements.

1.3 Clefs

The available clefs are found in Figure 1.3. You may omit the clef.

G-Clef:	`\vio`
F-Clef:	`\bass`
C-Clefs:	`\bariton \tenor \alto \mezzosopran \sopran`

Figure 1.3: Available Clefs.

I have found the last two clefs to be identical in practice. Could this be an error in MusiXTeX?

1.4 Keys

The available keys are found in Figure 1.4. You may omit the key. Finally,

Major Keys ♯:
`\C \G \D \A \E \H \Fis`
Major Keys ♭:
`\F \B \Es \As \Des \Ges \Ces`
Minor Keys ♯:
`\me \mh \mfis \mcis \mgis \mdis`
Minor Keys ♭:
`\ma \md \mg \mc \mf \mb \mes`

Figure 1.4: Available Keys.

note that in german music notation, `\H` stands for our `\B`, and `\B` stands for our `\B`♭.

1.5 Time Signature

The time signature is optional and can be changed anywhere. A typical example would be:

```
\meter{3}/{4}
```

One can use for ₵ the following:

```
\meter{}/{\music\allabreve}
```

One can also use for $\subset$:

```
\meter{}/{\music\mC}
```

And for $\supset$:

```
\meter{}/{\music\mCreverse}
```

Chapter 2

Notes and Rests

2.1 Pitches

The internal pitch of symbols is specified with integer numbers. The convention is that the lowest horizontal line of the staff is numbered 0, and the upper one is numbered 8. Positive and negative integer values are allowed.

The available pitch changes for notes are listed in Figure 2.1. These pitch

$\sharp$	is obtained with	`\x{`*internal pitch*`}`
$\sharp\sharp$	is obtained with	`\xx{`*internal pitch*`}`
$\natural$	is obtained with	`\n{`*internal pitch*`}`
$\flat$	is obtained with	`\b{`*internal pitch*`}`
$\flat\flat$	is obtained with	`\bb{`*internal pitch*`}`

Figure 2.1: Note Pitch Changes.

changes go in pair with their respective notes. MuTEX is insensitive to spaces between them. Leger lines are also added for pitch changes below or above the staff.

Accidental pitch changes are stand alone symbols. However, they would not function properly, apparently because of the presence of `@` signs in their name. I recommend in Appendix C that you rename them. The available pitch changes for accidentals[1] are listed in Figure 2.2.

[1]These accidentals were originally named `x@`, `n@`, and `b@`.

$\sharp$	is obtained with	`\xA{`*internal pitch*`}`
$\natural$	is obtained with	`\nA{`*internal pitch*`}`
$\flat$	is obtained with	`\bA{`*internal pitch*`}`

Figure 2.2: Accidental Pitch Changes.

The note pitch changes go in pair with their notes, and the spacing in between these symbols is automatically supplied. However, accidental pitch changes do not insert space anywhere around themselves. This was necessary since they are internally used by MuTEX for the staff signature which calls for no spacing between symbols. Consequently, you will need to create space by putting some `$\,$` in your input file around accidental pitch changes whenever you use them.

2.2 Notes

The available notes are listed in Figure 2.3. The stem of the note is auto-

`\g{`*internal pitch*`}`	Whole Note (semibreve)
`\h{`*internal pitch*`}`	$\frac{1}{2}$ Note (minim)
`\v{`*internal pitch*`}`	$\frac{1}{4}$ Note (crotchet)
`\a{`*internal pitch*`}`	$\frac{1}{8}$ Note (quaver)
`\s{`*internal pitch*`}`	$\frac{1}{16}$ Note (semi-quaver)
`\z{`*internal pitch*`}`	$\frac{1}{32}$ Note (demisemi-quaver)
`\d{`*internal pitch*`}`	$\frac{1}{64}$ Note (demidemisemi-quaver)
`\o{`*internal pitch*`}`	$\frac{1}{128}$ Note (demidemidemisemi-quaver)

Figure 2.3: Available Notes.

matically oriented. In case you should not be satisfied with MuTEX's choice, use the `\chord` command described in Section 2.3 about chords to select the stem orientation. Leger lines are also added for notes below or above the staff. Discussing triplets is delayed until Section 7.6, since they involve a grouping command.

2.3 Chords

You can specify chords using the following commands:

`\rchord{`*note(s)*`}\endchord`	Downward Stem
`\lchord{`*note(s)*`}\endchord`	Upward Stem

You must select the desired stem orientation for MuTEX, and this feature can be used to force the stem's orientation of single notes. There is some confusion concerning the order in which notes should be supplied. The original german documentation requested top to bottom order, while the original german demo used bottom to top order. I have used both orders without problems, but I would advise against using random order.

2.4 Rests

The available rests are listed in Figure 2.4 and they all assume an internal pitch of 5, which need not be specified. Unfortunately, the current release of

`\dpdd`	Four Measures Rest
`\dpg`	Three Measures Rest
`\dpd`	Two Measures Rest
`\pg`	Whole Rest
`\ph`	$\frac{1}{2}$ Rest
`\pv`	$\frac{1}{4}$ Rest
`\pa`	$\frac{1}{8}$ Rest
`\ps`	$\frac{1}{16}$ Rest
`\pz`	$\frac{1}{32}$ Rest
`\pd`	$\frac{1}{64}$ Rest
`\po`	$\frac{1}{128}$ Rest

Figure 2.4: Available Rests.

MuTEX does not yet have the fonts for `\pz`, `\pd`, and `\po`. They simply come up as `\ps`.

2.5 Dots

You can specify a dot count after some note or rest with the following command:

`\.{`*number*`}`

The number must be supplied. The internal pitch is automatically derived from the previous note or rest.

Chapter 3

Text

Text can be entered below or above the staff with the commands:

> _*positioning*{*text below*}{*note(s)*}
> \^*positioning*{*text above*}{*note(s)*}
> _*positioning*{*text below*}\^*positioning*{*text above*}{*note(s)*}

The order in the last command is important. Always start with text going below the staff before the text going above the staff. Failure to do so results in unpredictable behavior.

The available positioning characters are:

- **n** Width of the text not considered.
- **c** Text will be centered, this is the default.
- **l** Left justified with consideration to text width.
- **r** Right justified with consideration to text width.
- **v** Text directly below its note(s) but never on the staff
  (for `\_` only).

I noted that the `r` option does not appear to work properly with text, but works with `\boxed`.

The text is normally below or above the staff and is further adjusted if it should conflict with symbols already below or above the staff. These text entry commands are also used for the `\boxed` command of Section 4.3, and the fixed accents of Section 5.2. I also found that MusiXTEX is not very robust if you use the last command (text below and above at the same time), and then specify different positioning for the text below and above. One seems better off using default positioning.

If you are not satisfied with the height of the text, use something like:

```
\^{\raise number\nhh\hbox{text}}{note(s)}
\^{\lower number\nhh\hbox{text}}{note(s)}
```

The quantity `\nhh` is the quantity used in defining internal pitches.

If you ever need to put text below or above an empty space, use something like:

```
\^{text}{\vrule height number\nhh %
width 0pt \gluebrule}
```

The height of the staff is `4\nhh`. This is used in the second example of Appendix A.

For multiple lines of text, use something like:

```
\^{$\hbox{first line \hfill}\atop%
\hbox{second line \hfill}$}{note(s)}
```

Chapter 4

Punctuation

4.1 Bar-Lines

Figure 4.1 lists the available bar-line symbols. They all assume an internal pitch of 8, which need not be specified. MuTeX can only split staffs at the

<table>
<tr><td><code>\|</code></td><td>Normal Bar-Line</td><td>𝄀</td></tr>
<tr><td><code>\=</code></td><td>Closing Bar-Line</td><td>𝄂</td></tr>
<tr><td><code>\doublebarline</code></td><td>Double Bar-Line</td><td>𝄁</td></tr>
<tr><td><code>\rightrepeat</code></td><td>Right Repeat Bar-Line</td><td>𝄇</td></tr>
<tr><td><code>\leftrepeat</code></td><td>Left Repeat Bar-Line</td><td>𝄆</td></tr>
<tr><td><code>\leftrightrepeat</code></td><td>Double Repeat Bar-Line</td><td>𝄇𝄆</td></tr>
</table>

Figure 4.1: Available Bar-Lines.

location of bar-lines. You may experience difficulties if you have a lot of symbols between two consecutive bar-lines.

4.2 Crescendo

You can specify crescendo and decrescendo marks above the staff with the following:

`\cresc{`*note(s)*`}`
`\decresc{`*note(s)*`}`

The height of these marks will automatically be adjusted to lie above any notes already above the staff. MuTeX does not split staffs while processing these commands.

4.3 Orientation Marks

Enter text to be put in a box on the staff with the command:

\boxed{*text*}

The boxed text is put by default on the staff. Use the commands \^ or _ previously described in Chapter 3 about text entry to have the box put on top or below the staff. You may have to use a positioning command.

4.4 Breathing Marks

Enter a breathing mark with:

\caesura

4.5 Boxes

You can specify two boxes in a row with the command:

\1{*note(s)*}\2{*note(s)*}*

The :|| is automatically supplied for you at the end of the first box. You must supply the proper bar-line command at the end of the second box. The boxes are simply numbered 1 and 2. The two boxes must lie on the same staff. I think this is an area where improvements could be made, like multiple boxes, and more complex numbering.

Chapter 5

Accents

There are two types of accents:

Floating Accents: These go directly above or below their supporting notes, and often lie on the staff.

Fixed Accents: These always lie above or below the staff.

5.1 Floating Accents

Figure 5.1 lists the available floating accents. The internal pitches used are automatically derived from the notes below or above them. Once set,

`\stac`	Staccato	·
`\staccatissimo`	Staccatissimo	'
`\tr`	Trill	*tr*
`\trbrack`	Trill	*(tr)*
`\tenuto`	Tenuto	–
`\plus`	Trill	+
`\noaccent`	No Accent	

Figure 5.1: Available Floating Accents.

an accent remains effective until the `\noaccent` command is encountered. Don't forget it or else they will pile up!

5.2 Fixed Accents

Figure 5.2 lists the available fixed accents[1]. These must always be part of a `\^` or `\_` command as described in Chapter 3. There is no need for a `\noaccent` command after their use since they are treated as text. The height of these accents will automatically be adjusted to lie above or below any notes already above or below the staff.

[1]The author recommends you add the `fermateup` and `fermatedown` fixed accents to MuTeX.

`\dec`	Small >
`\fermateup`	𝄐
`\fermatedown`	𝄑
`\cantusfirmus`	*c.f.*
`\crescendo`	*cresc.*
`\dacapo`	*d.c.*
`\dalsegno`	*d.s.*
`\decrescendo`	*decresc.*
`\diminuendo`	*dim.*
`\fine`	*fine*
`\forte`	*f*
`\fortissimo`	*ff*
`\fortissimoposs`	*fff*
`\fortepiano`	*fp*
`\forzato`	*fz*
`\mezzoforte`	*mf*
`\mezzopiano`	*mp*
`\piano`	*p*
`\pianissimo`	*pp*
`\pianissimoposs`	*ppp*
`\rallentando`	*rall.*
`\rinforzando`	*rfz.*
`\ritardando`	*rit.*
`\ritenuto`	*riten.*
`\sforzato`	*sfz*
`\sforz`	*sf*
`\staccato`	*stacc.*
`\tacet`	*tacet*
`\unisono`	*unis.*

Figure 5.2: Available Fixed Accents.

Chapter 6

Two-Voice Music

Two-voice composition is specified with the following:

`\two{`*note(s) above*`}`
    `{`*note(s) below*`}`

You will note that spaces between both voices in the input file are allowed, which can improve somewhat the readability. Both voices must have the same number of elements. Combine a note and its pitch change into one element by including them within braces `{` and `}`, likewise for notes and dots. Note that MuTeX never splits a two-voice group of notes from one staff to the other. Therefore, it is preferable to specify the bar-lines while not in two-voices mode.

The stems of notes may conflict sometimes: use the `\chord` command of Section 2.3 to impose the correct behavior. An additional potential problem occurs with rests which lie at a fixed internal pitch. You may find it useful to modify a rest's internal pitch with commands like:

`{\raise` *number*`\nhh\hbox{`*rest*`}}`
`{\lower` *number*`\nhh\hbox{`*rest*`}}`

This trick and the quantity `\nhh` were already introduced in Chapter 3. Take a careful look at the first example of Appendix A. This has been used near the end of it.

Chapter 7

Grouping

7.1 Grouping Template

The grouping command is necessary to specify slurs and beams. It is quite flexible, but requires a fair amount of information. Grouping commands are of two forms of increasing complexity:

```
\group{element list}
       {pitch list}slur list\go
```

```
{\def\beamlist{beam list}%
\group{element list}
       {pitch list}slur list\go}
```

Note again where spaces can be introduced in the input file for better readability.

The first form can handle all slurs as well as single beams. Therefore, it can be used for all groupings involving whole, half, quarter, and eighth notes only. If more than one level of beams is needed in the grouping, then the second more complex form must be used. Here again, MuTEX never splits a group from one staff to the other. I now describe the various lists just introduced.

7.2 Element List

The element list specifies the notes making up the group. It has the form:

`\\{`*note*`}` ... `\\{`*note*`}`

Make sure the notes in the element list are compatible with the beams you will later request. It is quite possible for a group to span several bar-lines, these bar-lines are then elements of the element list. A good example of this is found in the second example of Appendix A. Take a look at it!

7.3 Pitch List

The pitch list specifies the internal pitch of each element in the element list. It has the form:

`\\{`*internal pitch*`}` ... `\\{`*internal pitch*`}`

Note that internal pitches are already specified as part of the notes in the element list. Nevertheless, they must again be specified in the pitch list. In addition, some elements of the element list are normally supplied without an internal pitch, i.e., bar-lines. You must also supply their implicit internal pitch in the pitch list. Remember that bar-lines have an internal pitch of 8, and that rests have one of 5.

This may all sound like an unnecessary large amount of information. But the freedom to perturb slightly the internal pitches in the pitch list allows one to improve the positioning of beams and slurs. Such fine tuning is not normally necessary, but for example, is mandatory for triplets discussed in Section 7.6. It is also nice to have such a fine tuning available at all time.

7.4 Slur List

The slur list specifies all the required slurs, and the beams at the eighth level only. It may contain several of the following:

`\uslur{`*begin number*`}{`*end number*`}`	Slur above the group
`\lslur{`*begin number*`}{`*end number*`}`	Slur below the group
`\ubeam{`*begin number*`}{`*end number*`}`	Eighth Beam above
`\lbeam{`*begin number*`}{`*end number*`}`	Eighth Beam below

The numbers range from 1 to the number of elements in the element list. If you ask for a beam, MuTEX will first check if it involves only eighth notes. If so, it will generate the beam immediately. If the beam involves sixteenth notes or even smaller notes, MuTEX will use your beam list.

7.5 Beam List

The beam list tells MuTEX what structure of beams should be used. The number of stems involved in each `\beam` command must equal the number of stems involved in the beam list. A typical beam list looks like:

`\\{`*level list*`}` ... `\\{`*level list*`}`

The first level list controls the eighth beams, the second the sixteenth beams, etc. A level list is defined as:

number`-`*number*`,` ... *number*`-`*number*`,`

These numbers are the consecutive pairs of extreme stems linked by a beam at the current level. This may sound a little bit complicated for the beginner, but believe me, it really isn't. There is a simple use of the beam list in the first example of Appendix A. Take a look.

The default beam list is defined in MuTEX as:

```
\\{1-n,}
```

where `n` is the number of elements in the current element list. This explains why the first form of the grouping command introduced in Section 7.1 can handle notes with an eighth beam at most. This is exactly the beam list that would be needed.

I haven't experimented a lot with grouping, but I would recommend you specify all the quantities involved in the obvious increasing order.

7.6 Triplets

This is the logical place to discuss triplets as they involve a slur. A typical triplet looks like:

```
\group{\\{\v{4}}%
\\{\^{\lower 1.25\nhh\hbox{3}}{\v{5}}}\\{\v{6}}}
      {\\{5}\\{6}\\{7}}\uslur{1}{3}\go%
```

The symbol 3 is entered using one of the standard text command introduced in Chapter 3. Its height has also been lowered to help fitting it under the slur. Finally, the height of the slur has been increased also to help make room for the 3. This is accomplished by increasing the pitches in the pitch list.

Appendix A

Examples

Even though we have covered all the main features of MuTEX, there is nothing like a couple of examples to help clarify things. A couple of demo pieces of music are supplied with MuTEX. Here is how both are written. We must thank the authors A. Steinbach and A. Schofer for these examples.

A.1 Bach

```
\title{Cello Menuet}
\poet{Viola}
\composer{Johann Sebastian Bach}
\universal
\beginsong\alto\F%
%
\meter{3}/{4}%
\rchord{\h{5}\h{7}\h{9}}\endchord%
\v{10}%
\|%
\two{\group{\\{\a{10}}\\{\a{9}}\\{\a{10}}\\{\a{8}}}
           {\\{10}\\{9}\\{10}\\{8}}\ubeam{1}{4}\uslur{1}{2}%
\go}
    {\rchord{\a{4}\a{6}}\endchord}%
\v{9}\|%
%
```

```
\rchord{\v{3}\v{5}}\endchord%
\v{8}%
\group{\\{\a{7}}\\{\a{6}}}
      {\\{7}\\{6}}\lbeam{1}{2}\go%
\|%
\two{\group{\\{\a{7}}\\{\a{6}}\\{\a{5}}\\{\x{4}\a{4}}%
\\{\n{3}\a{3}}\\{\a{2}}}
           {\\{7}\\{6}\\{5}\\{4}\\{3}\\{2}}\ubeam{1}{6}%
\uslur{1}{3}\go}
    {\a{2}}%
\|%
\rchord{\h{5}\h{7}\h{9}}\endchord%
\v{10}%
\|%
\two{\group{\\{\a{10}}\\{\a{9}}\\{\tenuto\a{10}\noaccent}%
\\{\tenuto\a{8}\noaccent}}
           {\\{10}\\{9}\\{10}\\{8}}\ubeam{1}{4}\uslur{1}{2}%
\go}
    {\a{6}}%
\v{11}%
\|%
\rchord{\v{7}\v{9}}\endchord%
\rchord{\v{3}\v{7}\v{12}}\endchord%
\rchord{\v{1}\v{8}\v{13}}\endchord%
\|%
\rchord{{\h{2}\.{1}}{\h{6}\.{1}}{\x{11}\h{11}\.{1}}}%
\endchord\leftrightrepeat%
%
\rchord{\h{9}\h{13}}\endchord%
{\def\beamlist{\\{{1}-{3},}\\{{2}-{3},}}%
\group{\\{\a{12}}\\{\s{13}}\\{\s{14}}}
      {\\{12}\\{13}\\{14}}\lbeam{1}{3}\uslur{1}{3}\go}%
\|%
\two{\group{\\{\a{13}}\\{\a{12}}\\{\x{11}\a{11}}\\{\a{13}}%
\\{\a{9}}\\{\a{8}}}
           {\\{13}\\{12}\\{11}\\{13}\\{9}\\{8}}\ubeam{1}{6}%
\uslur{1}{5}\go}
```

```
    {\a{8}}%
\|%
\two{\group{\\{\v{9}}\\{\v{12}}}
           {\\{9}\\{12}}\uslur{1}{2}\go}
    {\h{7}}%
\x{11}%
\two{\v{11}}
    {\v{6}}%
\|%
\two{\group{\\{\a{15}}\\{\a{14}}\\{\a{13}}\\{\a{14}}%
\\{\a{12}}\\{\n{11}\a{11}}}
           {\\{15}\\{14}\\{13}\\{14}\\{12}\\{11}}%
\ubeam{1}{6}\uslur{1}{5}\go}
    {\a{5}}%
\|%
\two{\h{10}}
    {\group{\\{\v{8}}\\{\v{7}}}
           {\\{8}\\{7}}\lslur{1}{2}\go}%
\two{\v{11}}{\v6}%
\|%
\two{\group{\\{\a{9}}\\{\a{8}}\\{\a{9}}\\{\a{7}}}
           {\\{9}\\{8}\\{9}\\{7}}\ubeam{1}{4}\go}
    {\a{7}}%
\rchord{\v{12}\v{6}\v{3}}\endchord%
\|%
\rchord{\v{11}\v{7}\v{2}}\endchord%
\group{\\{\a{10}}\\{\a{9}}\\{\a{8}}\\{\a{9}}}
      {\\{10}\\{9}\\{8}\\{9}}\lbeam{1}{4}\go%
\|%
\group{\\{\a{7}}\\{\a{6}}\\{\a{7}}\\{\a{9}}\\{\a{8}}%
\\{\a{10}}}
      {\\{7}\\{6}\\{7}\\{9}\\{8}\\{10}}\lbeam{1}{6}\go%
\|%
\x{7}%
\two{\tr\h{9}}
    {\h{7}}%
\two{\v{10}}
```

```
    {\pv}%
\|%
\b{6}%
\two{\group{\\{\a{8}}\\{\a{7}}\\{\a{8}}\\{\a{6}}}
           {\\{8}\\{7}\\{8}\\{6}}\ubeam{1}{4}\uslur{1}{2}%
\go}
    {\a{6}}%
\x{7}{\tr\v{7}}%
\|%
\rchord{\v{12}\v{8}\v{3}}\endchord%
\rchord{\v{11}\v{8}\v{4}}\endchord%
\two{\group{\\{\a{10}}\\{\a{9}}}
           {\\{10}\\{9}}\ubeam{1}{2}\uslur{1}{2}\go}
    {\v{5}}%
\|%
\group{\\{\rchord{\a{11}\a{5}\a{1}}\endchord}\\{\a{10}}%
\\{\a{9}}\\{\a{10}}\\{\a{8}}\\{\a{10}}}
         {\\{1}\\{10}\\{9}\\{10}\\{8}\\{10}}\lbeam{1}{6}\go%
\|%
\two{\group{\\{\v{12}}\\{\x{11}\v{11}}}
           {\\{12}\\{11}}\uslur{1}{2}\go}
    {\v{8}\pv}%
\n{7}%
\two{\v{12}}
    {\v{7}}%
\|%
\x{4}%
\two{\group{\\{\a{8}}\\{\a{7}}\\{\a{8}}\\{\a{6}}}
           {\\{8}\\{7}\\{8}\\{6}}\ubeam{1}{4}\uslur{1}{2}\go}
    {\a{4}}%
\two{\v{7}}
    {\v{5}}%
\|%
\group{\\{\a{1}}\\{\a{8}}}
      {\\{1}\\{8}}\lbeam{1}{2}\go%
\two{\tr\v{6}\.{1}}
    {\v{2}\.{1}}%
```

```
\two{\a{5}}
    {\raise-1.5\nhh\hbox{\pa}}%
\|%
\lchord{\h{5}\.{1}\h{2}\.{1}\h{-2}\.{1}}\endchord%
\rightrepeat%
%
\endsong
\bye
```

A.2 Distler

```
\def\@#1#2{{$\hbox{#1 \hfill}\atop\hbox{#2 \hfill}$}}
\title{Lobe den Herren}
\composer{Hugo Distler}
\parindent 40pt
\voice{Sopran}
\universal
\beginsong\vio\G%
\^r{\rm Schnell}{\vrule height 7\nhh width0pt\gluebrule}%
%
\meter{3}/{4}%
\_{\@{Lo-}{Mei-}}\^{\mezzoforte}{\v{2}}%
\_{\@{be}{ne}}{\v{2}}%
\_{\@{den}{ge-}}{\v{6}}%
\|%
\_{\@{Her-}{lie-}}{\v{4}\.{1}}%
\_{\@{ren,}{be-}}{\a{3}}
\_l{\@{den}{te}}{\v{2}}%
\|%
\_l{\@{m\"{a}ch-}{See-}}{\v{1}}%
\_{\@{ti-}{le,}}{\v{0}}%
\_{\@{gen}{das}}{\v{-1}}%
\|%
\_{\@{K\"{o}-}{ist}}{\h{0}}%
\group{\\{\_n{\@{nig ---}{mein ---}}{\v1}}\\{\|%
\meter{2}/{4}}\\{\v1}}
```

```
      {\\{1}\\{0}\\{1}}\lslur{1}{3}\go%
\_{\@{der}{Be-}}{\v{2}}%
\|%
\meter{4}/{4}%
\_{\@{Eh-}{geh-}}{\h{3}}%
\_{\@{ren!}{ren.}}{\h{2}}\rightrepeat%
%
\meter{3}/{4}%
\_r{Kom-}\^{\forte}{\v{6}}%
\_{met}{\v{6}}%
\_{zu}{\v{6}}%
\|%
\_{Hauf!}{\h{7}\.{1}}\caesura%
\|%
\_{Psal-}{\v{4}}%
\_{ter}{\a{5}}%
\_l{und}{\a{5}}
\group{\\{\_{Har-}{\v{6}}}\\{\|}\\{\_{-}{\a{6}}}%
\\{\_{-}{\a{7}}}\\{\_{-}{\a{6}}}\\{\_{-}{\a{4}}}%
\\{\_{-}{\v{6}}}\\{\|}\\{\_{-}{\a{6}}}\\{\_{-}{\a{7}}}%
\\{\_{-}{\v{6}\.{1}}}\\{\_{-}{\a{7}}}\\{\|}%
\\{\_{-}{\v{6}\.{1}}}}
      {\\{6}\\{8}\\{6}\\{7}\\{6}\\{4}\\{6}\\{8}\\{6}\\{7}%
\\{6}\\{7}\\{8}\\{6}}\lbeam{3}{6}\lbeam{9}{10}\uslur{1}{3}%
\uslur{7}{9}\uslur{1}{14}\go%
\_{fe,}{\a{5}}%
\_l{wacht}{\v{4}}%
\|%
\_{auf,}\^{\piano}{\h{3}}%
\group{\\{\_n{wacht}{\caesura\a{4}}}\\{\a{2}}}
      {\\{4}\\{2}}\ubeam{1}{2}\go%
\|%
\_{auf,}\^{\dec}{\h{3}}%
\group{\\{\_n{wacht}\^{zart}{\caesura\a{4}}}\\{\a{2}}}
      {\\{4}\\{2}}\ubeam{1}{2}\go%
\|%
\_{auf,}\^{\dec}{\h{6}\.{1}}\caesura%
```

```
\|%
\_{las-}\^{\forte}{\v{-1}}%
\_{set}{\v{0}\.{1}}%
\_{den}{\a{1}}%
\|%
\meter{4}/{4}%
\_{Lob-}{\h{2}}%
\_{ge-}{\v{3}}%
\_{sang}{\v{4}}%
\|%
\meter{7}/{4}%
\group{\\{\_{h\"{o}}{\h{5}}}\\{\_{-}{\v{4}\.{1}}}%
\\{\_{-}{\a{3}}}\\{\_{-}{\v{2}}}\\{\_{-}{\h{3}}}}
      {\\{5}\\{4}\\{3}\\{2}\\{9}}\uslur{1}{5}\go%
\|%
\meter{3}/{4}%
\_{ren!}{\h{2}\.{1}}%
\=%
\endsong
\bye
```

Appendix B

TEXnicalities

Here is information of a more technical nature. Like me, you may never need any of this, but since it was included in the original german documentation, I decided to make it available anyway.

B.1 MuTEX Fonts

The fonts used by MuTEX can be specified with the control sequences in Figure B.1.

`\music`	Music Sign
`\beamfont`	Beam Font
`\slurfontuu`	Slur Font (concave, rising)
`\slurfontud`	Slur Font (concave, falling)
`\slurfontdu`	Slur Font (convex, rising)
`\slurfontdd`	Slur Font (convex, falling)
`\eightrm`	Eight-Point Roman Font for Text

Figure B.1: MuTEX Fonts.

B.2 Music Characters

The characters[1] introduced by MuTEX are listed in Figures B.2 and B.3.

Note Heads:		
`\quart`	`\hex21`	Crotchet Note Head
`\half`	`\hex22`	Minim Note Head
`\whole`	`\hex23`	Semibreve Note Head
Flags:		
`\eighthup`	`\hex28`	8^{th} Upward
`\eighthdown`	`\hex2D`	8^{th} Downward
`\sixteenthup`	`\hex29`	16^{th} Upward
`\sixteenthdown`	`\hex2E`	16^{th} Downward
`\thirtytwoup`	`\hex2A`	32^{nd} Upward
`\thirtytwodown`	`\hex2F`	32^{nd} Downward
`\sixtyfourup`	`\hex2B`	64^{th} Upward
`\sixtyfourdown`	`\hex30`	64^{th} Downward
`\hundredtwentyeightup`	`\hex2C`	128^{th} Upward
`\hundredtwentyeightdown`	`\hex31`	128^{th} Downward
Rests:		
`\wholerest`	`\hex3C`	Whole Rest
`\halfrest`	`\hex3D`	Half Rest
`\quartrest`	`\hex3E`	Quarter Rest
`\eighthrest`	`\hex3F`	Eighth Rest
`\sixteenthrest`	`\hex40`	Sixteenth Rest
Measure Rests:		
`\doublerest`	`\hex3A`	Two-Measure Rest
`\ddoublerest`	`\hex3B`	Four-Measure Rest

Figure B.2: Music Characters (Part 1).

B.3 Alterable Parameters

A few alterable parameters are found in Figure B.4.

[1]The author recommends changing the names of the fermata characters to allow the implementation of the fermata accents.

Fermatas:		
`\ffermateup`	`\hex50`	𝄐
`\ffermatedown`	`\hex51`	𝄑
Pitch Changes:		
`\mflat`	`\hex32`	$\flat$
`\mdoubleflat`	`\hex33`	Double-$\flat$
`\mquartflat`	`\hex37`	Quarter-$\flat$
`\mthreequartflat`	`\hex3A`	Three-Quarters-$\flat$
`\msharp`	`\hex34`	$\sharp$
`\mdoublesharp`	`\hex35`	Double-$\sharp$
`\mnatural`	`\hex36`	$\natural$
Clefs:		
`\mviolin`	`\hex47`	Trebel Clef
	`\hex48`	Smaller Trebel Clef
`\mbass`	`\hex49`	Bass Clef
	`\hex4A`	Smaller Bass Clef
`\mbariton`	`\hex4D`	Baritone Clef
`\mtenor`	`\hex4C`	Tenor Clef
`\malt`	`\hex4B`	Alto Clef
`\mmezzosopran`	`\hex4E`	Mezzosoprano Clef
`\msopran`	`\hex4E`	Soprano Clef
Time Signatures:		
`\mC`	`\hex53`	𝄴
`\allabreve`	`\hex52`	𝄵
`\mCreverse`	`\hex54`	ↄ

Figure B.3: Music Characters (Part 2).

`\textline`	Interval between text and lowest line of staff
`\minsl`	Minimal stem-length of note
`\overtext`	Accompanying text above the staff
`\undertext`	Accompanying text below the staff

Figure B.4: Alterable Parameters.

B.4 Glue Parameters

Spacing between notes is controlled by glues, i.e., penalties associated with different spacings. Figure B.5 lists the ones defined by MuTeX.

`\NOTEskip`	Whole Note Glue
`\noteskip`	Minim Note Glue
`\noteskip`	Crotchet Note Glue
`\notEskip`	8^{th} Note Glue
`\noTEskip`	16^{th} Note Glue
`\nOTEskip`	32^{nd} Note Glue
`\nOteskip`	64^{th} Note Glue
`\nOtEskip`	128^{th} Note Glue
`\ruleskip`	Rules Glue
`\hunkskip`	Notes and Rules Glues

Figure B.5: Glue Parameters.

B.5 Glue Macros

Section 1.2 about MuTeX's preamble introduced the five available spacings. Figures B.6 to B.10 present these spacings in terms of MuTeX's glue parameters.

```
\def\hsmall{%
\Noteskip 3\nhw plus 2\seminhw minus 2\seminhw
\NOTEskip = \Noteskip
\noteskip 2\nhw plus 1.5\seminhw  minus 1.5\seminhw
\notEskip 1\nhw plus \seminhw  minus \seminhw
\noTEskip \z@ plus 0.5\seminhw  minus \z@
\nOTEskip=\noTEskip \nOteskip=\noTEskip \nOtEskip=\noTEskip
\hunkskip \z@ \relax}
```

Figure B.6: Glue Parameters for `hsmall`.

```
\def\small{%
\Noteskip 3.5\nhw plus 1.8\seminhw minus 1.8\seminhw
\NOTEskip = \Noteskip
\noteskip 2.5\nhw plus 1.4\seminhw  minus 1.4\seminhw
\notEskip 1.5\nhw plus \seminhw  minus \seminhw
\noTEskip \seminhw plus 0.6\seminhw  minus 0.6\seminhw
\nOTEskip=\noTEskip \nOteskip=\noTEskip \nOtEskip=\noTEskip
\hunkskip \z@ \relax}
```

Figure B.7: Glue Parameters for `small`.

```
\def\universal{%
\Noteskip 4\nhw plus 1.6\nhw minus 1.6\nhw
\NOTEskip = \Noteskip
\noteskip 3\nhw plus 1.3\nhw  minus 1.3\nhw
\notEskip 2\nhw plus \nhw  minus \nhw
\noTEskip \nhw plus 0.6\nhw  minus 0.6\nhw
\nOTEskip=\noTEskip \nOteskip=\noTEskip \nOtEskip=\noTEskip
\hunkskip \z@ \relax}
```

Figure B.8: Glue Parameters for `universal`.

```
\def\wide{%
\Noteskip 4\nhw plus 1.42\nhw minus 1.42\nhw
\NOTEskip = \Noteskip
\noteskip 3.5\nhw plus 1.28\nhw  minus 1.28\nhw
\notEskip 2.5\nhw plus \nhw  minus \nhw
\noTEskip 1.5\nhw plus 0.9\nhw  minus 0.9\nhw
\nOTEskip=\noTEskip \nOteskip=\noTEskip \nOtEskip=\noTEskip
\hunkskip \z@ \relax}
```

Figure B.9: Glue Parameters for `wide`.

Recall that the default spacing is `\universal`. Finally, the glue for rules is defined as:

```
\ruleskip  = \nhw plus \seminhw minus \seminhw
```

```
\def\loose{%
\Noteskip 5\nhw plus 1.5\nhw minus 1.5\nhw
\NOTEskip = \Noteskip
\noteskip 4\nhw plus 1.25\nhw  minus 1.25\nhw
\notEskip 3\nhw plus \nhw  minus \nhw
\noTEskip 2\nhw plus 0.75\nhw  minus 0.75\nhw
\nOTEskip=\noTEskip \nOteskip=\noTEskip \nOtEskip=\noTEskip
\hunkskip \z@ \relax}
```

Figure B.10: Glue Parameters for `loose`.

B.6 Base Line Macros

Use the following macros to tell MuTEX that your piece of music will span one or several staffs.

`\baselinesa`	Single Staff
`\baselinesb`	Multiple Staffs

Figure B.11: Baselineskip Macros.

The default is naturally:

```
\let\baselines = \baselinesb
```

Appendix C

MuTEX Patches

I found several errors in the original german version of MuTEX. Since I cannot take the liberty of correcting them myself, I simply list here the changes I suggest you make to your copy. These corrections would be performed, of course, on `mtex.doc` and `mtex.tex`. I would advise against distributing modified copies.

Keys

The definition of the minor key `\mdis` could be corrected. I'm no professional musician, but that key doesn't look right to me.

The definition would go from:

```
\let\mdis=\F                    \let\ma=\C
```

to:

```
\let\mdis=\Fis                  \let\ma=\C
```

There is also an internal error in the major key `\D`. Replace `\x@5` by `\n@5` near the end of the line. This error is obvious by inspection of all key definitions.

The definition would go from:

```
\def\D{\signature{\x@8\x@5}{\n@8\x@5}}
```

to:

```
\def\D{\signature{\x@8\x@5}{\n@8\n@5}}
```

Staccatissimo

The definition of `\staccatissimo` could be corrected. MuTEX uses the nonexistant size `\ssize` to print a prime symbol in math mode. I would change this to `\scriptstyle` size which is defined in TEX.

The definition would go from:

```
\def\staccatissimo{\setbox\akzentbox%
  \hboxnhw{$\ssize\prime$}{\box\akzentbox}}
```

to:

```
\def\staccatissimo{\setbox\akzentbox%
  \hboxnhw{$\scriptstyle\prime$}{\box\akzentbox}}
```

Boxes

The definition of `\1` ... `\2` ... `\*` could be corrected. The numbering of boxes is done using the `\music` font instead of the `\rm` font. One gets music symbols instead of numbers under the boxes! I would change `\repbox{1.}` to `\repbox{\rm{1.}}`, and do a similar thing with `\repbox{2.}`.

A line would go from:

```
\vbox{\halign{##\cr\repbox{1.}\r@lef@ll{\linethickness}\cr
```

to:

```
\vbox{\halign{##\cr\repbox{\rm{1.}}\r@lef@ll{\linethickness}\cr
```

Another line would go from:

```
\repbox{2.}\r@lef@ll{\linethickness}\cr
```

to:

```
\repbox{\rm{2.}}\r@lef@ll{\linethickness}\cr
```

I also found that undefined glue is used. I would replace `\setgluebrule` with `\gluebrule`, and do a similar thing with `\setgluearule`.

A line would go from:

```
\repstrut\setgluebrule\doppelpunkt\kern\seminhw\thinvrule\cr}}}
```

to:

```
\repstrut\gluebrule\doppelpunkt\kern\seminhw\thinvrule\cr}}}
```

Another line would go from:

```
\repstrut\thickvrule\setgluearule#1\cr}}%
```

to:

```
\repstrut\thickvrule\gluearule#1\cr}}%
```

Fermatas

Although the fermatas are available in MuTEX as characters, there is no facility provided for using them. I felt their use closely resembled that of fixed accents like *fff*, and I recommend supplying the necessary commands.

Since I would like to use the original character name as my new command name, I would rename the characters from `\fermateup` to `\ffermateup`, and do a similar thing with `\fermatedown`.

The character definitions would go from:

```
\chardef\fermateup=\hex50
\chardef\fermatedown=\hex51
```

to:

```
\chardef\ffermateup=\hex50
\chardef\ffermatedown=\hex51
```

Finally, I would introduce the `\fermateup` and `\fermatedown` fixed accents. The file would now look like:

```
\def\sforz{{\it sf}}
\def\staccato{{\it stacc.}}
\def\tacet{{\it tacet}}
\def\unisono{{\it unis.}}
\def\fermateup{\hskip-0.5\nhh\raise0.5\nhh%
\hbox{\music\ffermateup}}
\def\fermatedown{\hskip-0.5\nhh\raise1.5\nhh%
\hbox{\music\ffermatedown}}
```

Accidentals

Here is a weird error I could never fully understand. There is confusion when accidentals in some input file are expanded. For example, I found that the accidental `\b@{4}` was interpreted by MuTEX as `\b{@4}`. MuTEX would then complain that the command `\b` was undefined, or that it was expecting a number after `\b`, but not `@4`. Strangely, this is not a problem for MuTEX when it uses accidentals internally to create the signature from the `\key` command.

I would replace `\b@` by `\bA`, and do a similar thing with `\x@` and `\n@` so that now no confusion is possible.

The definitions would go from:

```
\def\b@#1{\setsign{#1}{\mflat}}
```

```
\def\x@#1{\setsign{#1}{\msharp}}
\def\n@#1{\setsign{#1}{\mnatural}}
```
to:
```
\def\bA#1{\setsign{#1}{\mflat}}
\def\xA#1{\setsign{#1}{\msharp}}
\def\nA#1{\setsign{#1}{\mnatural}}
```

Of course, the signatures would need to be fixed accordingly.

The definitions would go from:
```
\def\F{\signature{\b@4}{\n@4}}
\def\B{\signature{\b@4\b@7}{\n@4\n@7}}
\def\Es{\signature{\b@4\b@7\b@3}{\n@4\n@7\n@3}}
\def\As{\signature{\b@4\b@7\b@3\b@6}{\n@4\n@7\n@3\n@6}}
\def\Des{\signature{\b@4\b@7\b@3\b@6\b@2}{\n@4\n@7\n@3\n@6%
\n@2}}
\def\Ges{\signature{\b@4\b@7\b@3\b@6\b@2\b@5}{\n@4\n@7\n@3%
\n@5\n@2\n@5}}
\def\Ces{\signature{\b@4\b@7\b@3\b@6\b@2\b@5\b@1}%
  {\n@4\n@7\n@3\n@5\n@2\n@5\n@1}}
\def\C{\signature{}{}}
\def\G{\signature{\x@8}{\n@8}}
\def\D{\signature{\x@8\x@5}{\n@8\n@5}}
\def\A{\signature{\x@8\x@5\x@9}{\n@8\n@5\n@9}}
\def\E{\signature{\x@8\x@5\x@9\x@6}{\n@8\n@5\n@9\n@6}}
\def\H{\signature{\x@8\x@5\x@9\x@6\x@3}{\n@8\n@5\n@9\n@6%
\n@3}}
\def\Fis{\signature{\x@8\x@5\x@9\x@6\x@3\x@4}{\n@8\n@5\n@9%
\n@6\n@3\n@4}}
```
to:
```
\def\F{\signature{\bA4}{\nA4}}
\def\B{\signature{\bA4\bA7}{\nA4\nA7}}
\def\Es{\signature{\bA4\bA7\bA3}{\nA4\nA7\nA3}}
\def\As{\signature{\bA4\bA7\bA3\bA6}{\nA4\nA7\nA3\nA6}}
\def\Des{\signature{\bA4\bA7\bA3\bA6\bA2}{\nA4\nA7\nA3\nA6%
\nA2}}
\def\Ges{\signature{\bA4\bA7\bA3\bA6\bA2\bA5}{\nA4\nA7\nA3%
\nA5\nA2\nA5}}
\def\Ces{\signature{\bA4\bA7\bA3\bA6\bA2\bA5\bA1}%
```

```
  {\nA4\nA7\nA3\nA5\nA2\nA5\nA1}}
\def\C{\signature{}{}}
\def\G{\signature{\xA8}{\nA8}}
\def\D{\signature{\xA8\xA5}{\nA8\nA5}}
\def\A{\signature{\xA8\xA5\xA9}{\nA8\nA5\nA9}}
\def\E{\signature{\xA8\xA5\xA9\xA6}{\nA8\nA5\nA9\nA6}}
\def\H{\signature{\xA8\xA5\xA9\xA6\xA3}{\nA8\nA5\nA9\nA6%
\nA3}}
\def\Fis{\signature{\xA8\xA5\xA9\xA6\xA3\xA4}{\nA8\nA5\nA9%
\nA6\nA3\nA4}}
```

That's all so far.

Appendix D

Setting Up MuTEX

I had never used TEX or METAFONT[1] before coming across MuTEX and I sure went through a few hours of frustration before getting things running properly. I hope the following will save you some trouble.

Here are the files in your MuTEX package:

`readme`	This brief description of all files
`mtex.txt`	Brief description in german of german files
`mtex.tex`	MuTEX commented in german in TEX
`mplain.tex`	MuTEX plain format in TEX
`mtexdemo.tex`	Demo in german written in TEX
`bach.tex`	First demo written in MuTEX
`distler.tex`	Second demo written in MuTEX
`mtexinfo.tex`	Command reference in german written in TEX
`guide.tex`	Guide in english written in LATEX
`mf`	METAFONT input files for MuTEX
`tfm`	TEX font metrics files for MuTEX
`dpi118`	Fonts at 118DPI for Sun raster screen
`dpi120`	Fonts at 120DPI for Micro-TEX
`dpi240`	Fonts at 240DPI for Epson printer
`dpi300`	Fonts at 300DPI for Canon-CX Laserwriter

[1]Trademark of Addison-Wesley Publishing Company.

D.1 METAFONT

The first step in setting up MusiTeX is to generate the proper fonts for your previewing and printing devices. This is done with the METAFONT package which is made up of two different programs. Note that these two programs are sometimes combined into one bigger one. The presence of a `-i` or `/i` flag on the command line may determines the behavior. There may also be two script (or batch) files on your system which take care of calling that single program with the proper flags and paths set. This is an area you will have to investigate on your own. For the sake of simplicity, let's consider we simply have:

`inimf`	Initialization Program
`mf`	Font Program

These two programs work on METAFONT input files that specify the characters whose fonts you want to create, and that also include control commands. The standard METAFONT package includes such an input file, the `plain.mf` file. MusiTeX also includes thirteen such input files in its `mf` directory. These are:

`beam16.mf`	`music16.mf`	`slurdd16.mf`	`slurdu16.mf`
`slurud16.mf`	`sluruu16.mf`	`slur16.mf`	`musicdef.mf`
`acc16.mf`	`noten16.mf`	`pause16.mf`	`sonder16.mf`
`vio16.mf`			

You will have to generate fonts for the first seven of these, the remaining six are actually called upon automatically by the first seven, when needed. However, you may be in luck. You have already been supplied with four sets of fonts. If the ones you need are amongst these four, you need not use METAFONT at all!

If you need to generate your own fonts, you will have to give METAFONT some information about their desired characteristics. This is done with a METAFONT mode definition file. Figure D.1 shows the mode definition file, `epson.mf`, for my Epson FX-80 9-pin printer. If you don't have a mode definition file for your device, consult your local TeX wizard. There are small libraries of them around.

Once you have your mode definition file, it is time to initialize METAFONT. Check if this step has not already been performed on your system. You initialize METAFONT with the program `inimf` and the input file

```
mode_def epson =        % Epson (TUGboat 8,2 p. 133)
 proofing:=0;           % we are not making proofs
 fontmaking:=1;         % we are making a font
 tracingtitles:=0;      % do not show titles in the log
 pixels_per_inch:=240;  % 240 DPI horizontal resolution
 blacker:=0;            % do not make the pens any blacker
 fillin:=0;             % do not compensate for fillin
 o_correction:=.2;      % suppress most overshoots
 aspect_ratio:=9/10;    % 216 DPI vertical resolution
 enddef;
```

Figure D.1: Mode Definition File.

`plain.mf`. Simply type `inimf plain` and wait for the `*` prompt, then type `\dump`. A base file `plain.base` will be created for you by `inimf`. That's all there is to it.

You are now ready to create your own fonts. You will need the program `mf`, the base file `plain.base` just created, and your mode definition file, say `epson.mf`. Remember, the following step must be performed seven times. Let's consider the first input file `beam16.mf`. Type in `mf &plain epson` and wait for the usual `*` prompt. Then confirm that you want to generate fonts using the `epson.mf` mode definition file by typing `\mode:=epson;`. Then specify the desired size with `\mag:=magstep(0.0);`. Finally, specify the input file with `input beam16`. The rest is automatic. I must point out again things may be slightly different on your system.

After you have performed the latter step with the first seven input files, you will find that seven TEX font metric files, i.e., `beam16.tfm`, were generated along with the font files. This is normal behavior for `mf`. The font metric files are already supplied in the directory `tfm` with MusiXTEX. They should be identical to yours. Use whichever you want.

The seven font files should look like `beam16.240gf`. The 240 comes from the horizontal resolution in your mode definition file. This is all that is needed for some systems and you may already be all set up as far as the fonts are concerned. However, some systems require that you compress the font files using the program `gftopk` which is widely available in TEX circles. For example, typing `gftopk beam16.240gf` would create the file `beam16.240pk`. Personally, I have found that Sun previewers require the standard font files, while my version of TEX requires the compressed font files.

You probably will have to move the TEX font metric files, your seven previewing font files, and your seven printing font files in some specific directories on your system. You will have to find out which ones on your own.

D.2 TEX

The second step in setting up MuTEX is to initialize TEXwith it. As was the case for METAFONT, the TEX package is made up of two different programs. The same remarks as in the case of METAFONT apply. These two programs could be combined into one on your system. If this is the case, they are likely accessed through script (or batch) files. Let's assume that they are separate:

`initex`	Initialization Program
`tex`	Typesetting Program

These two programs work on TEX input files that specify the text you want to typeset, and that also include control commands. The standard TEX package includes several such input files. You will need `plain.tex` and `hyphen.tex`. MuTEX also includes two such input files that you will need, `mtex.tex` and `mplain.tex`.

You initialize TEX with the program `initex` and the four input files just mentioned. Simply type `initex mplain` and wait for the usual `*` prompt, then type `\dump`. A format file `mplain.fmt` will be created for you by `initex`. Now, that was simple! You may have to move that format file in some specific directory on your system.

Suppose you want to process some piece of music, say `bach.tex`. You will need the program `tex`, the format file `mplain.fmt` just created, and your input file `bach.tex`. Then, just type in `tex &mplain bach`. This should create the file `bach.dvi` ready for previewing and printing. Try it with the two input files supplied with MuTEX, `bach.tex` and `distler.tex`. I will point out here again that things may differ slightly on your system.

Note that the file `mtexdemo.tex` in german supplied with MuTEX is meant to run on standard TEX, not on MuTEX. To process it, you should type something like `tex &plain mtexdemo`. Make sure the input file `mtex.tex` is in the same directory as `mtexdemo.tex` since the latter will ask TEX to read the former. I suspect you will never feel the need to process `mtexdemo.tex` since the two files `bach.tex` and `distler.tex` constitute equally valid examples.

The files you will need daily while using MuTEX are the seven font files (`beam16.240pk`,...) for your previewing and printing devices (fourteen fonts altogether), the seven TEX font metric files (`beam16.tfm`,...), and the format file `mplain.fmt`. You will also, of course, need the `tex` program and its standard accompanying files.

I hope this has proven of some help to you. Happy MuTEXing!