

TTRM 1.5

A MusiX_{TEX} preprocessor
for generating twelve-tone matrices

by Alexandros Droseltis

INTRODUCTION

TTRM is a program written by Alexandros Droseltis that generates a twelve-tone row matrix from a single given row. This is a table with the 48 forms of a series: 12 transpositions of the prime form, 12 of the retrograde form, 12 of the inverted form and 12 of the retrograde form of the inverted form. The output of the program is a TeXfile (.tex). In order to view the matrix with the normal music notation, you must have TeX and MusiXTeX installed on your disc.

CONTENTS

The contents of the TTRM 1.5 package are the following:

Source files:

- ttrm1_5.c
- include/ (directory)
 - transposer.h
 - translators.h
 - filters.h
 - printers.h

Executable Files

- ttrm, for Linux
- ttrm.exe, for Windows

Test Files

- test.ttrm
- test.pdf

Documentation

- documentation.pdf

Examples

- examples/ (directory)

COMPILATION

To compile the program, type in a shell:

```
# gcc -I include -o ttrm ttrm1_5.c
```

INPUT NOTATION

The input sequence of tones must be at the top of a text file (e.g. test.ttrm). There are two possibilities of notation, shown in the examples following:

1. The one that is used by the program MusiXTeX. In this notation, the notes of the names consist of two parts:

- a) the accidental (s. table Nr.1);
- b) the name of the note that corresponds with the notehead.

The octave's position is integrated in the latter (s. table Nr. 2).

-	flat
=	natural
^	sharp

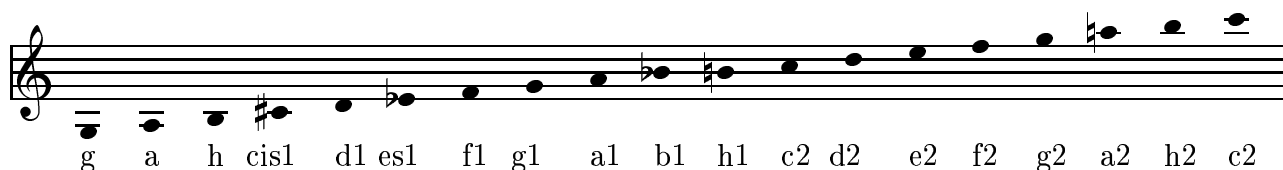
Table 1



Example 1

2. The other possible notation for TTRM is the german one. In this notation, the names of the notes consist of three parts:

- the first one defines the name of the note that corresponds with the notehead;
- the second defines the accidental;
- the third defines the octave's position of the note. If it does not exist, the position is 0 (s. following example).



Example 2

The accidentals for this notation are typed after the notes, as endings:

-(e)s	flat
-is	sharp

Table 2

At flat, the letter “e” is in brackets, because it is not used when the name of the note that corresponds with the notehead is an “e” or an “a”. Another exception is that “b flat” is spelled “b” and not “hes”.

N.B.: At this point of the process, TTRM does not support double accidentals as input.

The german system is easy if the user is familiar with the names of the notes, but the typing work is more. At the MusiX_{TeX}'s notation the opposite has power.

The names of the notes in the input file (.ttrm) must be separated with space . Under the row the user must enter a title for it. Examples can be found in the directory `examples/` of the package.

There is a possibility that the sequence of tones that is entered by the user (row, scale, etc.) consists of such letters so that it can not be clear which of the two systems (german or MusiX_{TeX}) is used, for example: c d e f g a h. In that case the program will function as if the german notation would have been ment. If the opposite is wanted, this must be clarified with a symbol that belongs to the MusiX_{TeX}notation, for example: c =d e f g a h.

Below the sequence of tones a title for it must be typed. If no title is wanted, just type `enter` two times.

USE

After you have created the .ttrm file, the program is ready to run. If the name of the file is `test.ttrm`, type in a shell:

```
# ttrm test.ttrm
```

The program will then produce the file `test.tex`. Now you must use TeX with MusiX_{TeX} in order to compile the file `test.tex`. Type:

```
# tex test.tex
```

The file `test.dvi` is produced. In order to view it correctly, let a .ps (postscript) file generated from the .dvi, and use an option for A4 page format. I suggest (if you have `dvips` and `gv`):

```
# dvips test.dvi
```

```
# gv -media a4 test.ps
```

OUTPUT NOTATION

On the generated table there are the title of the row and the 48 forms of it. The letter “P” indicates the prime forms, the letter “R” indicates the retrograde forms, the letter “I” indicates the inverted forms and the letters “RI” indicate the retrograde forms of the inverted forms.

The numbers at the left of the matrix indicate the first note of the P- and I-transpositions. 0 means C, 1 means C sharp (or D flat), 2 means D etc. For example, P7 is the prime form that starts from G, I8 is the inverted form that starts from G sharp or A flat. R_x or RI_x ($0 \leq x \leq 11$) are the retrograde forms of the respective P_x or I_x . e.g. R_9 is the retrograde form of P_9 , RI_2 is the retrograde form of I_2 . This notation is widely used for the twelve-tone analysis.

There is an other kind of matrix that is used too. It is the square matrix and it's in text mode. It consists horizontally of the twelve transpositions of the prime form of the row and vertically of the twelve transpositions of the inverted form of it. The opposite directions build the retrograde and retrograde-inversion respectively. The advantage of this matrix is that the whole network can be seen with one glance. For the generation of the square matrix, see chapter OPTIONS. Below you can see an example of the matrix for the row that is used by Berg in the opera Lulu:

c	e	f	d	g	a	fis	gis	h	ais	dis	cis
as	c	des	b	es	f	d	e	g	fis	h	a
g	h	c	a	d	e	cis	dis	fis	f	ais	gis
b	d	es	c	f	g	e	fis	a	gis	cis	h
f	a	b	g	c	d	h	cis	e	dis	gis	fis
es	g	as	f	b	c	a	h	d	cis	fis	e
fis	ais	h	gis	cis	dis	c	d	f	e	a	g
e	gis	a	fis	h	cis	ais	c	dis	d	g	f
des	f	ges	es	as	b	g	a	c	h	e	d
d	fis	g	e	a	h	gis	ais	cis	c	f	dis
a	cis	d	h	e	fis	dis	f	gis	g	c	ais
h	dis	e	cis	fis	gis	f	g	ais	a	d	c

Table 3

The programm will not print double accidentals or the notes “e & b sharp” and “f & c flat”. Instead of this, their enharmonic notes will be printed. In order to force the printing of the notes mentioned above, see chapter OPTIONS.

OPTIONS

The following flags can be used:

- e The command `\end` will not be printed at the end of the .tex file. This is useful, when many .tex files should be included in an other file.
- n The numbers 1—12 will not be printed under the notes.
- f1 The notes e sharp, f flat, b sharp and c flat will be printed, and not their enharmonic notes.
- f2 The use of double accidentals is enabled.
- P Only the P transpositions are printed.
- R Only the R transpositions are printed.
- I Only the I transpositions are printed.
- RI Only the RI transpositions are printed.
(The four options above can be combined, e.g. `-P -I`, or `-P -I -RI`.)
- s The square matrix is also printed on the screen (names of the notes).
- ss Only the square matrix is printed on the screen (names of the notes).
- a The square matrix is also printed on the screen (arithmetical).
- aa Only the square matrix is printed on the screen (arithmetical).
- -h Print this information and exit.
- -v Print the number of the program's version.

The combination “`-aa -s`” is the same with “`-a -ss`” and will print **only** the matrix with the names of the notes **and** the arithmetical one.

HISTORY

I started writing this program in June 2001 during the editing of my thesis on the twelve-tone works of Igor Stravinsky. It helped me very much generating the twelve-tone matrices. I hope it will be useful to other people too, for analytical as well as compositional purposes.

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CONTACT

Please send any comments, requests, bugs, suggestions or modifications to rakewell@udk-berlin.de

NOTES

In the examples, the rows at which no composer is mentioned at the titles, have been used by Igor Stravinsky.

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Alexandros Droseltis