

GLASHARFE

1982

open form

for harp solo, 'Tölzer Gabel', 'Tonleiter', glass percussion,
electronics and 8 magnetic fields

For all my friends with special thanks to Paul Godschalk and Thomas Rother

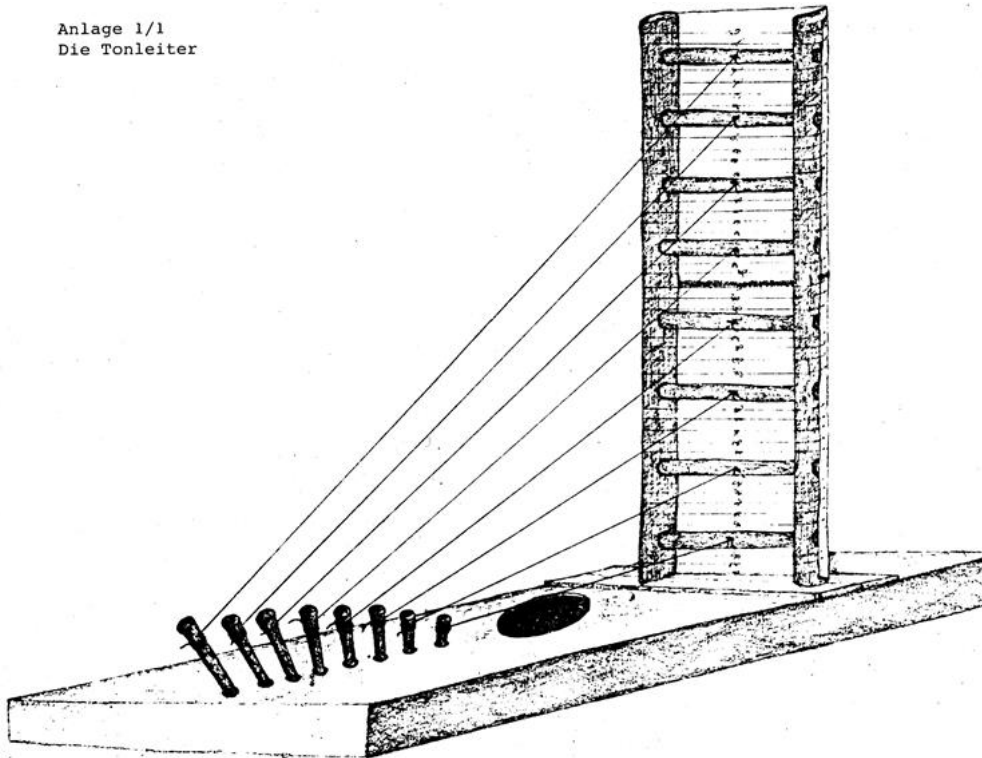
My composition 'Glasharfe' is about the theme of strings. I not only present the primarily acoustic characteristics of the string, e.g. overtone series, amplitude ratios, but also make use of various playing techniques.

1. Instruments

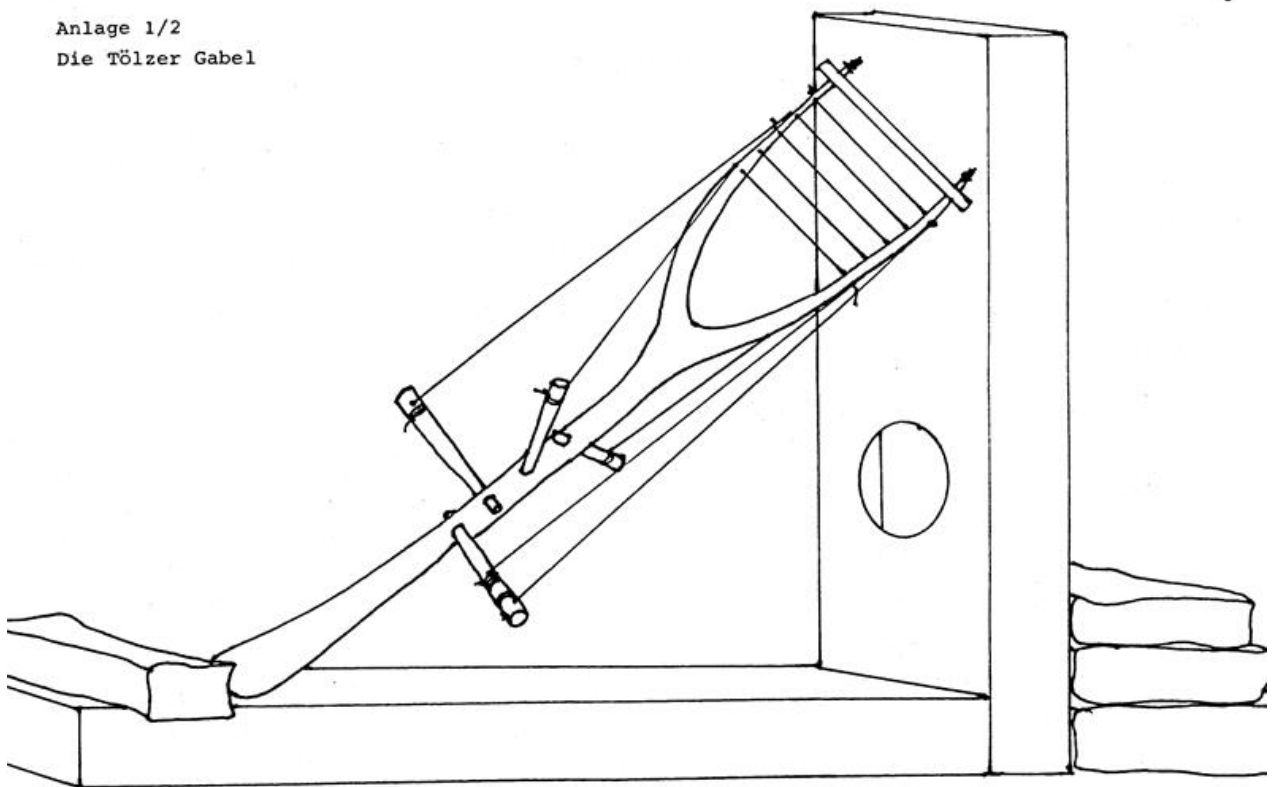
a. The 'Tölzer Gabel'; and the 'Tonleiter' (see Appendix 1)

In addition to the harp as a stringed instrument, I also use the 'Tonleiter' and the 'Tölzer Gabel'. The two instruments were designed and built with the collaboration of Michael Jüllich by the sculptor Thomas Rother in 1981 for the 'Spiel und Klangstrasse' in the German town Essen. The 'Tonleiter' is an eight-rung wooden ladder that stands in a resonance box. From rung to rung, the ladder is strung with animal sinews. When playing with e.g. bows or batons, a natural skin stretched in front of the ladder is made to sound. The 'Tölzer Gabel' is a large willow fork (from the German town Bad Tölz) that is strung crosswise and lengthwise with various animal sinews. These sinews are, among other things, torn, bowed. Two resonance boxes placed at right angles to each other amplify the sound. Both instruments are monitored with contact microphones (see technical set-up- Anlage 1/1 = the 'Tonleiter' and Anlage 1/2 the 'Tölzer Gabel').

Anlage 1/1
Die Tonleiter



Anlage 1/2
Die Tölzer Gabel



Tölzer Gabel Thomas Rother



The instrument maker Thomas Rother

b. The computer

The 8 bass strings of the harp (metal strings) are made to resonate by a computer via a terminal via 8 coils with magnetic fields (see technical description), i.e. the strings are 'automatically' played. This process takes place live. The computer is thus an independent 'real time' instrument within the composition.

The computer programme:

PER STEM:				TOTAAL:			
T/R/U	-toon/ritme/uit			SPATIEBALK	-start/stop de klok		
O/N	-glissando op/neer			S/L	-sneller/langzamer		
P/B	-gliss.naar plafon/bodem			W/G	-wel/geen liggende VCO's		
K/M/Z	-kruis/mol/zichzelf			D/H	-detektie/hand		
+/-	-fader op/neer			I	-instellen van VCO's		
^/v/HOME	-resonantie (..)			DELETE	-opnieuw starten		

.....	38							
1	5	2	2	4	6	0	7	nivo
4	4	4	10	4	3	5	4	harm.nr.
-	-	-	-	-	:	:	:	status
1=D#	2=E	3=F#	4=G	5=A b	6=B b	7=C	8=D	stemnr.
			*					8
			*					7
			*					6
			*					5 fader--
			*			*		4 stand
			*			*		3
*	*		*			*		2
*	*		*			*		1

The (above) computer programme, clearly visible on the TV screen of the terminal, does not work on its own initiative or with stored information. Each sound process is started and controlled by the operator by pressing the keys on the terminal. By pressing the numbers 1 - 8, the computer interpreter indicates which voice, i.e. which string, is to be changed by new commands. It is also possible to influence all 8 voices simultaneously (key 0).

The computer controls the frequencies of 8 generators (VCO, see technical construction) with the help of a digital-analogue converter, which translates digital information into analogue. The 8 oscillators in turn influence 8 coils that drive the harp strings. The sound of the strings is amplified by 8 contact microphones. The amplification is in turn controlled by a computer (D/A converter, VCA). On the TV screen, you can modulate the volume of the strings by pressing the +/- keys, just like on a mixing console (faderstand 1 - 8).

Each generator can receive 10 different frequencies, which in the case of the 'Glasharfe' correspond to the harmonic overtone series. (fundamental and 9 overtones). A total of 80 different pitches can thus be produced. Since the position of the overtones of a string is not tempered, however, a pre-calculated scale cannot be assumed, i.e. each individual tone must be tuned. Tuning means that each generator voltage must correspond to an overtone frequency. The overtone of a string will then be clearly audible. With the keys - resonantie ^/, / Home this tuning process is triggered. The transition between the frequencies can be jumping or gliding, i.e. either two tones in succession or a glissando between two tones are audible (keys glissando op/neer ; toon). A glissando can also run immediately to the 9th overtone or the fundamental (gliss., naar plafond/bodem).

Each overtone can also be rhythmised by playing the resonance tone 'pulsed' with a voltage controlled amplifier (rhythm).

Each voice can be modulated in pitch (e.g. d, dis, des; zichzelf, kruis, mol).

This process plays an important role in composition. By detuning, e.g. 'des', the generator voltage in relation to the tuned string 'dis' of the harp, the resonance is reduced. The computer game thus sets sound accents (see score page 2, I and II).

Each voice can be switched off (uit; clock uit).

The generator sound is also amplified directly (see Technical Setup). Oscillators can be heard as a sound surface (liggende VCO's wel; score page 11, 1) or rhythmised (score page 9, VCO rhythms).

The volume levels of the strings are translated into different voltage values with an amplitude demodulator. These values can determine the glissando speed and the rhythm structure as desired (detectie). Manually, the player can also select the rhythms (hand). The metre of the composition is determined by the computer (clock 38). The clock time can be changed as with the metronome (sneller/langzamer).

c. The wind machine and the buzzing woods

At the beginning of the composition, the harp is made to vibrate 'naturally' by a wind machine. This sound production corresponds to that of the Aeolian harp of antiquity, which was played by Aiolos, the Greek god of the winds. The wind alone is heard through the buzzing of Australian buzzing woods.

d. The glass instruments (see score description)

The glass sound of the harp, created by the resonances, evoked associations in me of using different glass instruments. Glass, shattering, struck or rubbed, expanded the sound structure of the composition.

e. The harp

The harp seemed to me to be a suitable string instrument. Not only the large tonal range, but also the visually visible strings make it possible to deal clearly with the subject of ' strings '. Also, the sound production is not obscured by the resonance box as is the case with a grand piano.

2. The amplification

All instruments are reproduced amplified with air or contact microphones. Since the volume differences of the various overtones of a string are subject to large fluctuations that cannot be equalised manually with a mixing console, 8 compressors were used to regulate the volume level. (COMPR)

3. Some thoughts

The use of the instruments in 'Glasharfe' presents three cultural idioms. The 'Tonleiter' and 'Tölzer Gabel' are purely built natural instruments. A return to the natural tone, to the origin of music, is obvious. The harp, a rococo instrument, embodies the world of the court, of the aristocracy. It is established in the conventional orchestral apparatus. The computer, the machine, symbolises our current technical age, the time of automatic processes and logical thinking. In my composition, I have tried to interpret these three worlds, both in terms of notation and content. In 'Glasharfe' they do not exclude or fight each other. They stand opposite each other in the field of tension of sound.