Marc Sabat

Wonderful Scatter
for 6-valve F-tuba, sensors, computer and loudpeaker

PLAINSOUND MUSIC EDITION
Wonderful Scatter
for tuba and computer (Marc Sabat, 2005)
6-valve F-tuba equipped with sensors for each valve, computer, loudspeaker
duration circa 2 hours

for Robin Hayward

The 6-valve F-tuba is equipped with 6 independent valves of different lengths, which may be combined in 64 possible ways including the open horn position (no valves depressed). If these valves are adjusted so that their lengths are proportional to each other (open tube-length : V1 : V2 : V3 : V4 : V5 : V6 = 45 : 6 : 3 : 9 : 15 : 8 : 4), then the 64 valve combinations produce 40 different possible lengths of tube ranging from 45 units ( oo / o oo ) to 90 units (●● / ●●●●). (There are only 40 tube-lengths because some of the 64 combinations are synonymous.) These tube-lengths form a set of fundamental pitches (pedal-tones) related to each other by natural number proportions and forming part of a subharmonic series. (In the case of this F-tuba tuning, the subharmonic series is generated by a high B-natural, tuned in unison with the third harmonic of a violin’s open E-string.) Over each of these subharmonic fundamentals, a tubist can play a harmonic series of overtones. Since all pitches produced in this way are related to each other by whole number ratios, the entire set forms a microtonal gamut in Just Intonation. [This tuning of the valve-combinations was devised in November 2004 by Marc Sabat in collaboration with Robin Hayward.]

For each of the 6 valves, a sensor is installed under the valve mechanism, which continually measures its position. The movements of valves produced by the tubist’s fingers (and thus information about the valve lengths being used at any given time) are transmitted in real-time across an ethernet cable to a computer. [The sensor mechanism used in this performance was developed in Berlin by Sukandar Kartidanata.]

The tubist plays all available pitches in the first four octaves of his instrument, organized in an ascending microtonal gamut. The lengths of notes in bpm are proportional to the respective tube lengths. Notes are separated in time by durations proportional to the melodic distance between them (measured in cents). Each semitone contains one minute of non-playing pause. After the second, third and fourth octaves, the player repeats the lowest octave (pedal tones).

A computer program (MAX/MSP patch) analyzes the played valve combinations. Corresponding to the 40 possible tube-lengths there are 40 loops, with (subaudio) lengths proportional to the respective fundamental wavelengths. Using information from the sensors, each new note is routed to its corresponding loop. Over the course of the installation, the computer acts as a memory-sieve, sorting the pitches played into 40 different overtone-series loops. These loops are activated one-by-one as the tubist changes fingerings. Depending on the lengths of the loops and of the notes played, the resulting textures range from a spectral chord to a chance-determined overtone melody.

A loudspeaker amplifies the output of the computer program, which eliminates higher frequencies (above 352 Hz), producing a soft, round sound resembling sinewaves. Thus, as the music progresses, each new note gradually merges with harmonically-related tones and the movement from tone to tone is transformed from a relationship based on melodic distance to various possible relationships of harmonic distance.

This piece is dedicated to composer and tubist Robin Hayward, with warm thanks for his ongoing collaboration, in particular, his idea for the “Double Tuba” valve tuning on which the current valve-combinations are based, and his suggestion to amplify and filter the tuba with a subwoofer speaker. The title is a literal English translation of the Latin Requiem Mass text “Tuba mirum, spargens sonum” (“War-trumpet wonderful, scatter sound”).
6-Valve F Tuba Tuning in Just Intonation

- tuning of the valve combinations devised by Marc Sabat based on Robin Hayward’s proposed “Double Tuba in F and C” valve tuning (Berlin 11.2004)
ote using the Extended Helmholtz-Ellis II Pitch Notation, accidentals designed by Marc Sabat and Wolfgang von Schweinitz, 2004
for Robin Hayward

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The first 2 pages are to be repeated after each new octave (indicated by signs in the score). Time between notes is measured in quarter notes at 100 bpm, following the rule 100 cents = 1 minute.

Black noteheads are to be recorded as quarter notes at the indicated tempo (exact bpm may be somewhat exaggerated to delineate the tempo relationships — *sempre poco rubato*).

White noteheads indicate a connected (quasi legato) sequence of quarter notes, one for each of the notated synonymous valve-combinations.
(on the final repeat, after 112 beats release all fingers to produce the fingering "45" without playing a note; slowly fade out loop)
(when repeating the pedal tones, play until the cut sign and then return to the respective higher octave)
one line = 50 cents

(before playing this note, repeat the first 2 pages (pedal tones), beginning directly at the first low "F")
one line = 25 cents

(before playing this note, repeat the first 2 pages)
(repeat the first 2 pages, end as indicated on page 2)