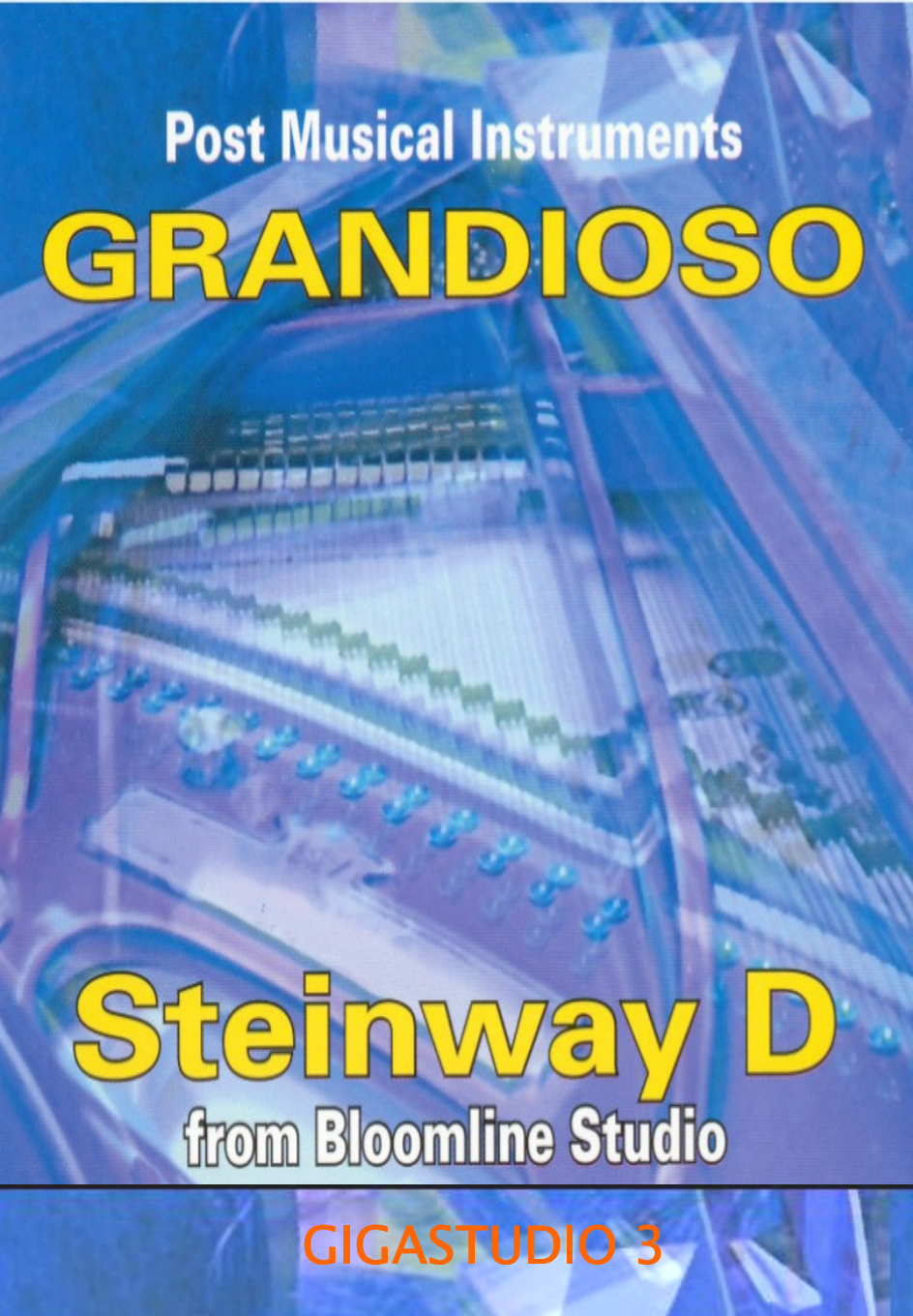
Post Musical Instruments
GRANDIOSO
Steinway D
from Bloomline Studio
GIGASTUDIO 3

Post Musical Instruments

GRANDIOSO Steinway D

CREDITS

Produced by Michiel Post

Recording engineer: Leo de Klerk/Michiel Post

Piano: Ludger de Graaff

Sample editing: Michiel Post

All programming: Michiel Post

Artwork: Michiel Post and Bloomline/Coryphée

About this project

This piano represents a big step in sampling, with over 5 gigabytes of loop-free stereo samples, rich resonant pedal down samples, release-triggered soundboard resonance that varies over time (great staccato playing), and wide dynamic range. It all comes down to the instrument - whose true character is captured in much greater detail than that attainable by previous technology. This library finally fulfils the logistical impossibility of bringing the world's top instruments into your studio.

About the Steinway D samples

We recorded the best grand piano we could find. Steinway is THE grand piano for most concert pianists. This particular instrument is in premium condition, a Steinway model D3 with serial number 393210 which was built in 1965. It was fully refurbished by Steinway Hamburg in 1999. This piano served the Rotterdam 'DOELEN' concert hall for several decades, where hundreds of famous musicians, from Claudio Arrau to the Rolling Stones, performed for live audiences and broadcast concerts.

Quality

We recorded in the best studio we could imagine using. Bloomline Studio is both extremely quiet (you can actually hear the blood flow in your ears), and is very large--well suited for the grand piano sound that needs a large space to develop its full tone. The studio is owned by Leo de Klerk who keeps the Steinway D in optima forma with incredible effort and attention.
We used the best microphones for the job. We wanted a microphone which was both extremely quiet for the best possible S/N ratio, and which had a truly flat frequency response. After several tests we chose the Senheisser MKH20 omnidirectional microphone, which has a noise level of below 9 dB (A) weighted. We positioned the microphones in an ORTF setting (90 degrees at 30 cm) at an optimum listening distance of 2 to 3 meters from the strings. The placement angle was very low, comparable to how a piano is heard in a typical concert hall.

The resulting sampled instrument sits solidly in the soundstage, rather than sounding as if suspended on a wall between the speakers. A second set of MKH20's was used from a large distance to capture the room ambience.

We captured the samples using the finest digital equipment available. Prism Sound a/d converters and bit splitters were used to record the 24 bit signal to Tascam DASH. A 24-bit ProTools TDM system with Mix+ card was used for editing and post production. Waves processing was used to eliminate unwanted frequencies and to do some level optimization. We have mapped up to 16 levels of velocity, true multiple velocity release layers, ultimate staccato, and sustained pedal-down samples with a carefully chosen amount of resonance. The end result was tested by several concert pianists, who helped us develop a sampled instrument which could meet their highest expectations.

There is no doubt in our minds that this is the best sampled piano ever.

INSTALLATION

You need around 6 GB of free disk space for the full installation. Run all 4 installers on the disk to install *PMI Steinway D, Steinway D Compressed, GigaPulseContent and GoldBundle LE*.
To run the installer simply double click on it, chose a directory (folder) where you want to locate your files) and press OK.

Updates: Free updates are available at www.postpiano.com
To register your purchase visit www.postpiano.com

THE PIANO PATCHES

We made 2 main instruments:

PMI Classic Steinway D (available as Steinway D LE) and PMI Compressed Steinway D.
Together they offer you full control over the world's most famous piano. Additionally, we added set-up files that can be used to quickly set-up your system for a specific task.

1 PMI Classic Steinway D
This is considered the main instrument of the set, and is best suited for most contexts. It has more character and realism than any other sampled piano we've heard. We used no processing other than level optimization, and a little eq to remove unwanted frequencies, (no limiting, no compression or expansion), ensuring the purest piano sound possible. The samples have no loops, they have rich resonant pedal down samples, release-triggered soundboard resonance, and an amazingly wide dynamic range. Listen to the rich world of overtones beautifully captured in these recordings.
To load the Classic Steinway D we recommend using the .gsi files that you will find in the folder. They load the right gigapulse content and mixer adjustments all in one go.

2 PMI Compressed Steinway D

The individual samples in this instrument have been processed. A special compression ratio was applied to each individual sample to achieve a higher level of sustain. Use this series of instruments in settings where you might normally use outboard compression...without the risk of pumping, breathing, or other post-compression artifacts.

16 velocity levels Post Steinway D Full Comp v1.5;
This patch has sixteen velocity groups. It uses all the sample layers (PPP, PP, P, MF, F, FF, FFF) and has additional "virtual" layers to further smooth transitions between the recorded sample groups. We used pedal-down samples exclusively in this instrument, for a warm and rich sound. Filters are used where needed to make the transitions between the virtual layers even smoother.

DYNAMICS
The main patches have been designed to play well using Fatar/Studiologic 990 and 1100 keyboards.
We have chosen to make velocity switching points at the next values for the middle 4½ octaves:

PP to P (if used)	37
P to MF	66
MF to F	97
F to FF	112

You may want to adjust your keyboard's velocity response to match these values. When you play melody lines around velocity value 70 to 80 they will sound at mf. If you want to have mf sound when lower velocity values you must adjust the velocity curve of the master keyboard to get a "softer" response. Alternatively you may want to open the instrument editor and lower the upper velocity boundaries. Every MIDI controller will have a slightly different"feel" and every player will have his own preferences. Be sure to experiment with velocity response in both your controller and in the programming of these instruments to customize them to your own preferences.

About the tuning of the Piano: Inharmonicity
Acoustically, a note perceived to have a distinct pitch contains frequency components that are integer multiples of its fundamental pitch. These are called harmonics or overtones. Each harmonic is a sine wave, and all complex waveforms are simply combinations of these simple fundamental and harmonic tones. Not only do these combinations serve to differentiate different timbres, they also form the basis of Western harmony. The frequency ratios of the harmonic series are known (see Table 1) and their equivalent musical intervals, frequency ratios and staff notation in the key of C are shown in the table below for the first ten harmonics. The musical intervals (apart from the octave) are only approximated on a modern keyboard due to the tuning system used.

Integer (N)	Overtone series ($(N-1) \times f_0$) when $N > 1$	Harmonic series ($N \times f_0$)	Component frequency (Hz)
1	fundamental frequency (f_0)	1st harmonic	1 f_0
2	1st overtone	2nd harmonic	2 f_0
3	2nd overtone	3rd harmonic	3 f_0
4	3rd overtone	4th harmonic	4 f_0
5	4th overtone	5th harmonic	5 f_0
6	5th overtone	6th harmonic	6 f_0
7	6th overtone	7th harmonic	7 f_0
8	7th overtone	8th harmonic	8 f_0
9	8th overtone	9th harmonic	9 f_0
10	9th overtone	10th harmonic	10 f_0

Table 1 The relationship between overtone series, harmonic series and fundamental frequency for the first ten components of a period waveform.

The musical intervals of adjacent harmonics in the natural harmonic series starting with the fundamental or first harmonic, illustrated on a musical stave and as notes on a keyboard in Table 2, are: octave (2:1), perfect fifth (3:2), perfect fourth (4:3), major third (5:4), minor third (6:5), flat minor third (7:6), sharp major second (8:7), a major whole tone (9:8), and a minor whole tone 00:9). The frequency ratios for intervals between non-adjacent harmonics in the series can also be inferred from the figure. For example, the musical interval between the fourth harmonic and the fundamental is two octaves and the frequency ratio is 4:1, equivalent to a doubling for each octave. Similarly the frequency ratio for three octaves is 8:1, and for a twelfth (octave and a fifth) is 3:1.

Intervals for other commonly used musical intervals can be computed from these basic relationships. For instance, the frequency ratio for a perfect fourth (4:3) can be derived from that for a perfect fifth (3:2) since together they make one octave (2:1): C to G (perfect fifth) and G to C (perfect fourth). The perfect fifth has a frequency ratio 3:2 and the octave a ratio of 2:1. Bearing in mind that musical intervals are ratios in terms of their frequency relationships, and that any mathematical manipulation must therefore be carried out by means of
division and multiplication, the ratio for a perfect fourth is that for an octave divided by that for a perfect fifth, or up one octave and down a fifth.

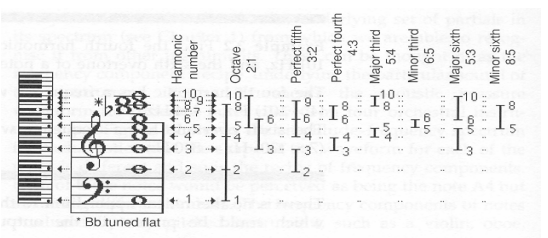

Table 2 Frequency ratios and common musical intervals between the first ten harmonics of the natural harmonic series of C3 against a musical stave and keyboard.

Sound source from a struck string

When a stringed instrument (like a piano) is struck, the same relationship exists between the physical point at which the strike occurs and the modes that will be missing in the sound source. The piano, due to its construction, imposes further anomalies. Piano strings are very hard, and they are under enormous tension compared with the strings on plucked instruments. When a piano string is struck, it behaves partly like a bar because it is not completely flexible. This results in a slight raising in frequency of all the component modes with the effect being greater for the higher modes, resulting in the modes no longer being exact integer multiples of the fundamental mode. This effect, known as 'inharmonicity', varies as the square of the component mode (n2), or harmonic number, and as the fourth power of the string radius (R4). Thus for a particular string, the third mode is shifted nine times (32) as much as the first, or fundamental, mode, and a doubling in string radius increases inharmonicity by a factor of sixteen (24). The effect would therefore be considerably greater for bass strings if they were simply made thicker to give them greater mass, and in many stringed instruments (including pianos, guitars and violins) the bass strings are wrapped with wire to increase their mass without increasing their stiffness. The notes of a piano are usually tuned to equal temperament, and

octaves are then tuned by minimizing the beats between pairs of notes an octave apart. When tuning two notes an octave apart, the components which give rise to the strongest sensation of beats are the first harmonic of the upper note and the second harmonic of the lower note. These are tuned in unison to minimise the beats between the notes. This results in the fundamental of the lower note being slightly lower than half the to of the higher note due to the inharmonicity between the first and second partials of the lower note.

Inharmonicity on a piano increases as the strings become shorter, and therefore the octave-stretching effect increases with note pitch. The stretching effect is usually related to middle C and tuning is "stretched" using this note as the basis. Figure 3 illustrates this effect in terms of the average deviation from equal-tempered tuning across the keyboard of a small piano. Thus, high and low notes on the piano are tuned sharp and flat respectively to what they would have been if all octaves were tuned pure with a frequency ratio of 2:1. From the Figure, it can be seen that this stretching effect amounts to approximately 35 cents sharp at C8 and 35 cents flat at Cl with respect to middle C.

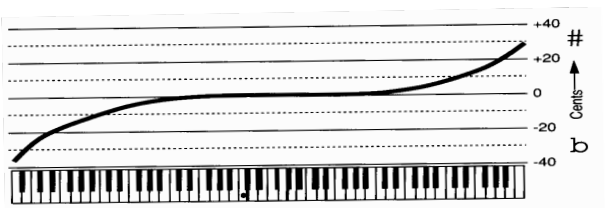

Figure 3 Approximate form of the average deviations from equal temperament due to inharmonicity in a small piano. Middle C marked with a spot.

The Post Steinway Model D piano was tuned according to the rules described in this section. The realistic harmonic "life" found in this sample set is partly a result of this tuning methodology.

About the Steinway Model D

Dimensions

Length:	8' 11-3/4" (274 cm)
Width:	61 1/4" (156 cm)
Netto Weight:	990 pounds (450 kg)

Soundboard: Created like the soundboard of violins to give a free and even response throughout the entire scale, the Steinway D's soundboard is constructed to be 9 mm thick in the center, and tapered to 6 mm as it approaches the rim and outer case before being DOUBLE CROWNED.
This design permits complete freedom of movement, while acting as a homogenous unit to displace a greater amount of air, thereby creating a richer and more lasting tonal response. Close-grained, quarter-sawn Sitka spruce, a wood having unusual stability and vibrancy under stress and vibration, is used exclusively for the soundboard.

Ribs: Made from durable, resinous sugar pine to assure strong and constant support of string down-bearing on the soundboard. Rib ends are hand-fitted into their mounting surfaces virtually locking in the important soundboard crown.

Bridges: TREBLE: Hard rock maple vertical laminations capped with solid hard rock maple; planed to prescribed height, graphite coated, drilled, and notched by hand for precise individual string bearing. Design defies splitting. BASS: Continuous with treble. Maple doweled, glued, and screwed to soundboard.
Scale : Over strung; combination agraffe; Front AND rear duplex. Tension: 45,373 lbs. (20,418 kg)

Strings: TREBLE: Twelve whole & one-half sizes from high-tensile Swedish steel. BASS: Swedish steel core wire wound with pure copper. Longest, agraffe to bridge: 79 1/4" (201 cm)

Hammers: 18.5-pound (8.39 kg) premium wool top felt over premium wool under felt; treated to resist insects and moisture. Compression-wired to retain permanent shape. Hard birch mouldings. Shanks from select resilient maple.
Dampers: Horizontal-cut premium wool for effective dampening. Maple heads for endurance.

Action: White, quarter-sawn maple parts are bushed with specially treated wool action cloth for freedom from friction. Parts are anchored in hard maple dowels housed in inflexible seamless brass tubing to assure precise & stable regulation. Exclusive single, combination phosphor bronze repetition and fly spring provides constant crisp touch response. Specially designed to respond 14% faster fortissimo & 6% faster pianissimo by using an exclusive combination of half-round balance rail bearings and strategically placed key leads.

Keys: Bavarian spruce, individually weighed-off. Chip-proof, stain-resistant coverings for naturals; slip-proof, delicately abraded ebonised sharps. Tough, durable Linden wood buttons reinforce keys over balance rail permitting maximum tonal power with every strike. Longest: 24 1/2" (62.2 cm)

Pedals: Heavy, solid brass. Soft, sustaining, and full sostenuto.

About Bloomline Studio

Equipment at Bloomline Coryphée: Bloomline Coryphée has a collection of over sixty microphones. Some are modified by Henk Prince or Ron Geluk. They use pre-amps, -convertors, custom made mixing consoles (Ton Verhoef) a HDSP-system for high definition sampling and surround-sound recording.

Details: One hundred square meter soundstage, Steinway D Grand-piano (1965), restored by Steinway, Hamburg, Reverb time: 0.3s 100Hz-1kHz.

Acoustic design: Twenty-five square meter control room, ESL63 electrostatis loudspeaker systems with subwoofers, driven by 4 Quad 606 amps. DA-88 and DA-38 multitrack-recorders with Prism Sound MT-2024 20/24-bit encoders, Accent 1 96 KHz / 24-bit dynamic processor, 3 editing-systems: 1 'high sampling' HDSP-version (192 KHz / 24-bit), 2x NoNoise® digital filters; more than 300 GB HD storage space.

Artists that recorded at Bloomline include:
Marjanne Kweksilber, Roberta Alexander, Anne Cambier, Jan Vermeulen, Viotta Ensemble, , Manja Smits, Djoke Winkler Prins, Ruud Bos, Steve Galloway, Rosa Ensemble, Douglas Sides, Fortepianotrio Florestan, Made in Leiden, and Sexteto Canyengue

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