Kawai America

Technical Support Department

Voicing the RX Series Grand Piano

Service Bulletin # 71-211

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Voicing the
RX Series
Grand Piano

Introduction

The Kawai RX series grand pianos are designed to be instruments capable of satisfying the most demanding musicians. The structure of the piano is designed for power, fullness and sustain. The action has been optimized for delicate control, efficient power transfer, and effortless repetition. The hammers are made with premium high density felt and a closely controlled pressing process so that, under the care of a skilled technician, the hammers can be voiced to suit the tastes of any musician performing in any style of music.

In the voicing department in Kawai's Ryuyo grand piano factory, many hours are spent on each instrument shaping and refining the tone for warmth, power and sustain. No matter how carefully done however, piano voicing is never permanent and no one voicing will suit the tastes of all pianists. It is the goal of this manual to describe in detail the voicing procedures used by Kawai's factory voicers and to guide the field technician through the steps of a careful voicing process.

1. Preparation of the action

A piano cannot be voiced well unless the action is carefully regulated first. The action must be capable of carrying the pianist's nuance through to the hammer, while losing a minimum of energy during powerful passages. Every aspect of the action should be evaluated for proper performance before hammer voicing is begun. If the action is not performing well, the time working with the hammers will be spent attempting to overcome the shortcomings in the action.

Prior to regulation and voicing of the instrument the following areas should be evaluated and problems corrected:

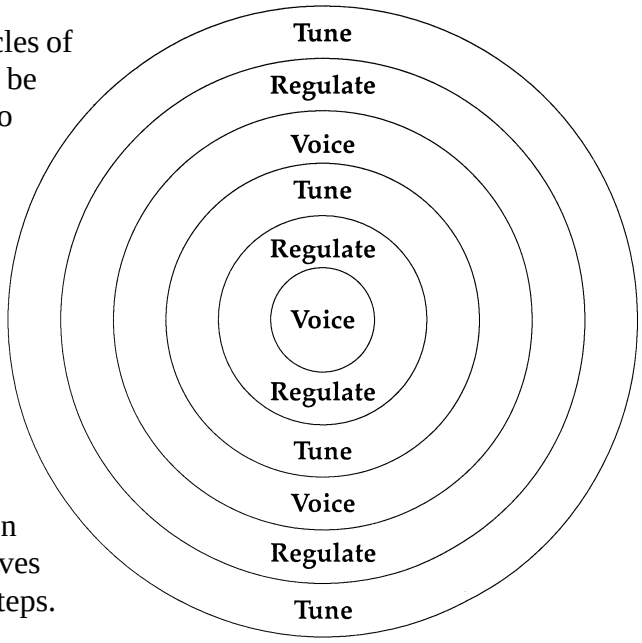
1. Keyframe (Bedding against the keybed, keyframe felt condition)
2. Key bushings (no excess play or friction)
3. Wippen cushions (wear)
4. Knuckle (Roller) shape and surface
5. Action centers, especially hammer shank centers

   These must be free, yet firmly controlled, and even in friction from note to note. The hammer shank centers should measure 2 to 4 grams of friction measured at the screw hole.
6. Regulation

   Please refer to the Kawai technical service manual for a detailed description of our regulation specifications and procedures.

Circle of refinement

All piano service should progress through ever finer circles of refinement. At the outermost circles, serious matters must be addressed, with rough tuning and repairs being made to eliminate the effects of wear on the action. Then the first regulation should space, travel and align the parts, and the action should be regulated to specifications. The next level is tuning and string spacing, then in the next the action spacing and regulation should be refined, then the first rough voicing can be done, and so on until the piano has been brought to its potential.



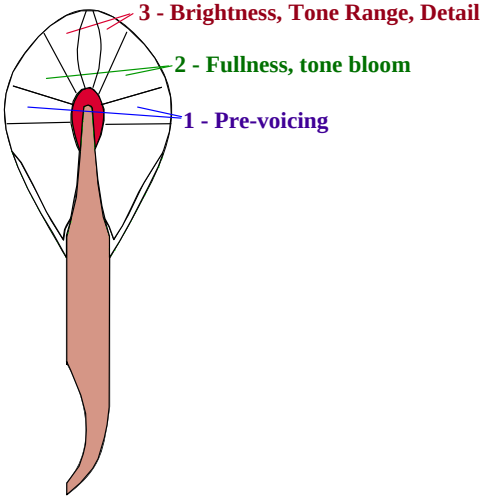
These voicing instructions commence with one of the inner circles of refinement, after the condition of the action is correct, the regulation and spacing of the action has been refined, the hammers have been filed to remove string grooves caused by wear, and the piano is ready for the first voicing steps.

1. Preparation of the hammers

A. Evaluate the overall tone. Keeping in mind the environment and use for the instrument, listen to the tone of the piano, playing chords or music at different volume levels. Listen for harsh or brittle tone, listen for excessive high harmonics in the bass, listen for dullness and lack of power.

B. Pre-voicing. Kawai hammers are pressed for high compression of the felt. This compression should remain unchanged under the strike point, where it will give brightness and power during Forte passages. Some of the tension in the shoulder areas is released by deep needling the hammers in the factory.

This deep needling is done in two stages in the Kawai factory; the first is done mechanically just prior to mounting the hammers on the shanks. Sample hammers are tested for hardness and rebound, and the shoulders are deep-needled by machine accordingly. The shoulders are then deep needled again in the voicing department according to their sound. It is not normally necessary for the hammers to be <u>extensively</u> deep-needled on the shoulders once the piano leaves the factory, although some deep needling may be called for to increase sustain or improve the sound of hammers that have been re-shaped. If you are installing new hammers, of course, then this deep pre-needling of the hammer shoulders would be required.



If the overall tone is too bright, the hammers should be deep needled in zone 2 on both sides of the hammers. Using 3 needles set to 6mm for the bass, 5mm in the tenor, and 4mm in the low treble, insert the needles all the way into the felt, pointing the needles in towards the wood molding, 4 or 5 times throughout this zone.

If this does not sufficiently soften the tone on the first pass, then those areas which are still generally too bright should be voiced again in the same way, moving slightly closer to the strike point. Do not voice on the strike point, nor should you allow the needles to pass under the strike point during this process.

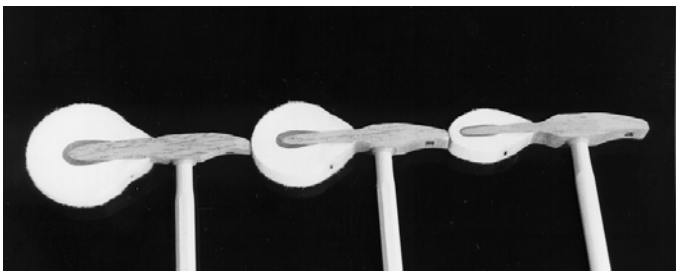
If the high treble is too bright, the same procedure may be used, but with fewer and shallower penetrations of the needles, closer to the strike point than in the tenor and bass.

If some part of the scale is too dull, those hammers should be tested for hardness by needling low down on the shoulders (below 3 o'clock). If the hammers feel soft and resilient in the low shoulders, needling in this area should not be necessary. Next, file the hammers on the upper shoulders and at the strike point to present a harder surface to the strings.

C. Testing / needling again. This process may need to be repeated a few times until the overall tone of the piano is at the approximate level desired. Be aware that too much needling will ruin the hammers, especially if they are needled too close to the strike point. Once the hammers feel resilient and soft in the shoulders, further needling in that area is not necessarily going to improve the tone, so moving to a different type of needling process in a different area should be tried to achieve the results you are seeking.

D. Shaping. The hammers must now be shaped to remove the excess outer felt which has been loosened by the voicing process. Only the outermost layer of felt should be removed, from the low shoulders all the way up over the strike point. Special attention should be paid to the smoothness of the strike point surface. Using fine sandpaper (400 - 1,000 grit) for the final shaping will allow the surface to be smooth and firm, making the later voicing process simpler. In some cases the use of 1000 grit emery cloth strips to "buff" the surface of the hammers, especially in the treble, will give the best final results and may help brighten the tone somewhat.

Be careful to maintain the proper shape of the hammer, not too round at the top, with slightly flattened shoulders. If the tone needs to be brightened more, then a liquid hardener may be applied to the hammer to add support under the strike point. This is rarely needed on Kawai pianos, though.



As a final step in shaping the hammers, raise the hammers up to the strike position using a long wood strip (or similar) under the hammer shanks. Smooth the strike surface, making sure the hammers are absolutely straight and level across the tops. Minimizing errors in the strike surface will greatly speed up the string leveling / hammer seating process.

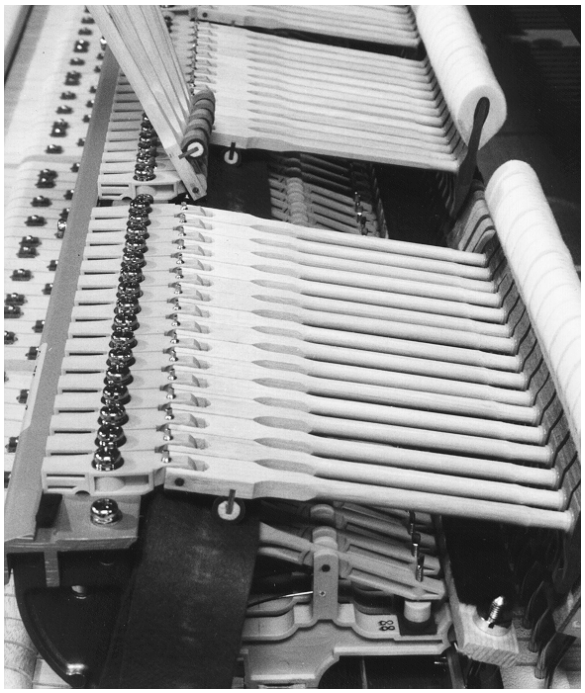


Figure 5: Felt strips under rollers raise hammers towards strings.

2. Seating the hammers to the strings.

Before putting the action back into the piano, raise the shanks up and place a long strip of felt (thick bushing cloth or the key-cover felt that comes with the piano works well), about 100cm x 4cm, under the hammer shank rollers. Lower the shanks down again and place the action back into the piano. Because of the felt under the rollers, playing the keys will cause the hammers to block against the strings.

Figure 6: With felt under rollers, hammers may be blocked simply by pressing the key.

Starting with the lowest bichord note in the bass, block each hammer against the strings by pressing the key, then pluck each string of the unison while maintaining pressure with the key, listening for even muting of the strings by the hammer head. If the strings are not evenly muted, the string which is more muted is lower than the others (making it tighter against the hammer). Using a string hook, pull up firmly on the low string close to the agraffe (or capo bar). This will sharpen the wire bend at the agraffe, making it level with the other string(s). If the pitch of the wire changes much, quickly retune the string. Test the note again, and re-hook the wires again as necessary. In some cases it is possible to lower a string slightly by pressing down on the string as close as possible to the agraffe. If you are having trouble getting the strings to fit the hammer correctly, re-check the hammer surface again, and file as needed to make it level. Work all the way up through the scale, matching the hammers and strings all the way to note 88.

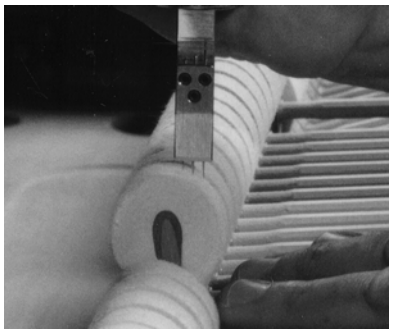
3. Tune the piano.

Since the strings are being moved through the agraffes and across the capo bar, some strings may be out of level after tuning, requiring a litte more string / hammer fitting. Listen for these unlevel strings as you tune the unisons.

4. Recheck regulation

Especially letoff, drop, blow distance, repetition springs, backchecks, key level and dip, and aftertouch.

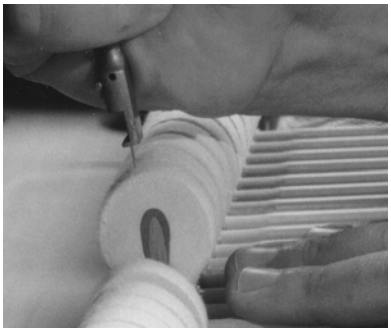
5. Voicing refinement



Listen. Play chords and arpeggios throughout the scale, listening to the balance of tone from one area to the others. Find a note in each section to use as an example for the notes around it. The tone should be solid (no weakness or fuzziness), clear, and free from harsh, brittle hard tone.

Compare the surrounding notes to your sample note. Correct the tonal problems as follows:

A. Softening the tone should be done either with a single needle, or with a three-needle voicing tool turned sideways, so that one needle penetrates just down the shoulder from the strike point. Insert the needle straight down into the felt, parallel to the hammer molding, about 4 - 6mm deep in the tenor hammers. The other two needles will also penetrate the felt, but not as deep.



B. Lack of solidity of tone can be caused by a few different problems:

- Loose hammer shank center pin
- Incorrect hammer alignment or traveling
- Excess needling at the strike point.
- Poor shaping of the strike point
- Unlevel strings, or unlevel hammer strike surface (not mated with the strings)

Listen to each string separately by muting the other 2 strings. If they sound different, recheck string seating first (block hammer, pluck strings). Then use the voicing tool sideways as described above to voice the hammer just at the end of the slight string marks on only those strings which are brighter. Do not needle at the strike point itself.

This technique of voicing for individual strings is important. If voicing is done across the full width of the hammers to soften bright hammers rather than listening to each string separately and voicing for each string as described above, then there will be a tendency to soften the hammers too much. Voicing for each string individually gives more control over the process, and prevents over-needling of the hammers.

Balance the tone

Play up and down through the scale, listening for a consistency of tone throughout. Do not allow yourself to focus on details of individual notes without considering that the entire section may be too bright or too soft.

Range of Tone

Different volume levels should produce different tone colors. When played softly, the hammer should produce a warm, controllable tone that is clear and sustains well but has no harshness. As the note is played more loudly, the tone color should brighten up, with more high harmonic content.

This range of tone is produced by careful, single needle voicing as described above, close to (but not on) the strike point of the hammer. The bright, strong tones of Fortissimo playing can be destroyed by over-needling the shoulders, especially in the upper shoulder area. For softer playing, a single shallow insertion of one needle at the ends of each string mark on the hammer should be used to give warmth and clarity to the sound.

As the hammer voicing process nears completion, depress the una-corda pedal and test the notes again softly. Use a mute to listen to individual strings, and refine the voicing for evenness with the pedal depressed. Some very shallow needling near the strike point on that area of the hammer which is contacting the string when the una-corda pedal is depressed can improve the warmth and clarity of the tone.

Hammer settling and smoothing

After needling, always resettle the felt. Either tap the hammer lightly with the back (flat) end of the voicing tool handle, or use a sanding paddle with fine paper (600 - 1,000 grit) to smooth the felt and erase the needle marks on the shoulders. Avoid the strike point to preserve the string seating.

Take a break

There is a natural tendency for the ears to become accustomed to the sound of the piano as you work on it. In essence, the ears become voiced to accept the piano tone instead of the piano tone becoming voiced to what the ear hears. As you work it is easy to overlook notes which stand out, and to lose the feeling for the overall tone you want from the piano. Take a break from voicing by working with the action, the pedals, refining the repetition springs, or some other job that doesn't require listening, then return to voicing after some time has passed. Play up and down the scale again, playing at different volume levels, and continue to eliminate notes which stand out. In the Kawai factory, every piano is checked by multiple voicers to be sure that "fresh ears" will hear any remaining uneven notes in the scale.

Conclusion

Tonal balance throughout the scale, evenness from note to note, a range of tone quality at different volume levels, fullness, power and projection, and a pleasing color to the sound which satisfies the pianist are the hallmarks of a fine instrument and a fine voicing. Under the care of an experienced and careful technician, the Kawai RX grand pianos have the potential for all of these qualities.

Do not be satisfied until the piano under your care has reached its potential. In learning to refine the sound, one learns to refine one's skills.

If you require more information or assistance regarding Kawai's voicing techniques, please contact your local Kawai distribution office.

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