The Divorced Low E Mechanism for Fox Contrabassoons

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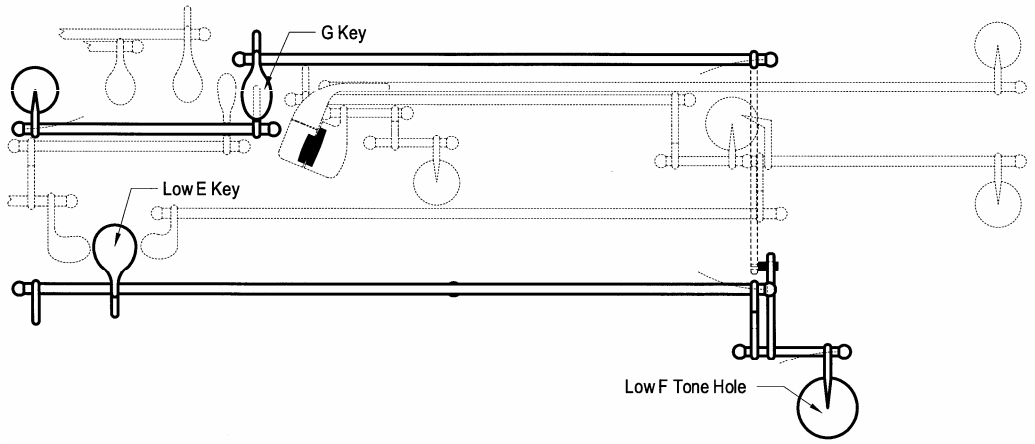

The Divorced Low E Mechanism is an enhancement to the contrabassoon designed and developed by Chip Owen. The objective of this new mechanism is to change how the low F tone hole is automatically opened or closed by certain fingerings. The status of this tone hole has a significant effect on the performance of the entire instrument.

The Divorced Low E Mechanism is now included in the options price list for Fox Contrabassoons effective with the 2003 price list. In addition to being offered as an independent option for standard Fox Contrabassoons, the Divorced Low E Mechanism is also included as part of the Fast System for contrabassoon.

The illustration above shows all of the keys operated by the right hand. The keys involved in the Divorced Low E Mechanism are shown with darker lines. Other keys are shown with lighter lines to help in visualizing the location of the mechanism.

The divorce and the new connection

This mechanism functions by a removing control of the low F tone hole from the lower vent key and creating a new control of that hole for the G key.

The lower vent key does two things on normal contrabassoons. The primary function is to open the two vent holes on the lower end of the mouthpipe and on the tuning slide. The secondary function is to close the low F tone hole by means of a link to the low E key. Closing this tone hole when the lower vent key is used enhances the qualities of certain notes. Unfortunately, it also causes problems for other notes. Additional notes could also be improved by closing it at times when the conventional mechanism leaves it open.

The "divorce" part of the Divorced Low E Mechanism refers to the severing of the connection between the lower vent key and the low E key. As with many divorces, a new relationship comes into existence. In the case of the Divorced Low E Mechanism the new relationship involves a connection between the G key operated by the third finger of the right hand and the low F tone hole.

The Divorced Low E Mechanism uses the open standing G spatula to hold the low F tone hole closed. When the G spatula is depressed the low F hole is allowed to open. The low E key can then close the low F hole to play lower notes.

Stabilizing the octave G♯

The original reason for this mechanism was to benefit the octave G♯ (top space, bass clef). This note suffers from instability on normal contrabassoons. The instability results when the low F tone hole is closed by depressing the lower vent spatula. Attempts to improve the note by opening the left forefinger half hole vent without using the lower vent key are usually unsatisfactory. The half hole helps, but the lower vent is needed. As soon as the lower vent key closes the low F tone hole the instability occurs. It is possible to partially depress the lower vent key to open the vents without closing the low E key, but this is too awkward to use on a regular basis.

The Divorced Low E Mechanism clears up the unstable octave G♯ by removing control of the low F tone hole from the lower vent spatula. The link to the G spatula now opens the Low F tone hole when the lower vent key is used to play the G♯.

Focusing the low A

A common problem on all contrabassoons is the poor focus of the low A (1st space, bass clef). The pitch of this note is so poorly focused that it can be difficult to be sure of just where the pitch center is located.

A related problem is that the tuning of the low A and octave A are usually noticeably different. The pitch of the low A sags and tends to shift with dynamic changes while the octave appears to be sharp by comparison.

A commonly used technique to correct these problems is to add the low E key to the fingering for the A. Closing the low F tone hole by depressing the low E key brings the pitch of the low A into focus.

On normal contrabassoons the low F tone hole is open for the low A (1st space, bass clef) and closed for the octave A (top line, bass clef). This difference is a result of the lower vent key being part of the fingering of the octave A. The linkage between the lower vent key and the low E key causes the pad on the low F tone hole to close. This results in an undesirable difference between the two notes. Closing this pad for the octave A results in a focused octave A. Leaving the pad open results an unfocused low A.

The Divorced Low E Mechanism provides the means to automatically hold the low F tone hole closed to focus the pitch of the low A. The control of the low F tone hole is completely separated from the lower vent key. The G key holds the low F hole closed when playing both the low A and the octave A.

With the Divorced Low E Mechanism the pitch focus of the low A is automatically corrected and now has a clearly defined pitch center and the performance qualities of both the low A and octave A are alike rather than very different. While it is possible to achieve a similar effect by adding the low E key to the fingering of the low A, key this mechanism does this automatically for the player.

Additional benefits

Other notes also benefit from the Divorced Low E Mechanism to lesser degrees. In addition to specific note corrections, players who have experienced this mechanism have commented that the overall tone of the instrument seems smoother.

The exact nature of the changes to various notes is variable. The pitch of some notes may raise while others lower. The tone of some notes may change. In general, the scale of the instrument seems to have fewer anomalies allowing the smoother results.

One side benefit is that the lower vent key becomes usable for the octave F♯ and G♮ in addition to the G♯. On a normal contrabassoon, using the lower vent key would result in closing the low F tone hole which would ruin the F♯ and G♮.

Lower Notes

It is important to note that this mechanism has no effect on notes below the low A. For all notes below the A, the G key is depressed which allows the low F tone hole to open. With the G key depressed, the control of the pad for the low F hole reverts to the low E key, which operates the pad in the normal manner. Closing the hole is done by the player's right thumb for all low notes. This is also true for any other notes that are fingered with the G key depressed.

Fingering changes

Few, if any, fingering changes will occur as a result of this mechanism. The only fingerings that may need a correction will always include both the lower vent key and the G key and will also be high notes in the range above notes using the upper vent key. If you use fingerings that include these details it may be necessary to add the low E key to the fingering to correct them.

Mechanical features

The illustration at the top of this article shows the Divorced Low E Mechanism in a convertible format. This is how it would be added to an existing Fox Contrabassoon. The detail that makes it convertible is the arm at the top end of the low E key. Normally this arm would be engaged by an arm from the lower vent key. The engagement on Fox contras is accomplished by means of a roller on the side of the vent key arm. Disengagement is done by simply removing the roller.

If the player should ever want to revert to the original system, the roller connecting the G key to the pad key for the low F tone hole must be removed. That same roller can then be used to reconnect the vent key to the low E key; some adjustment may probably be needed to coordinate the lower vent key with the pad on the low F tone hole. The only benefit to reverting to the original system would be to remember all the problems the Divorced Low E Mechanism cured.

A secondary benefit of the Divorced Low E Mechanism is the opposed hinge spatula for the G key. On normal contrabassoons, the touches for the first two right hand finger keys are hinged beyond the tips of the fingers, while the G spatula is hinged under the fingers. This results in opposing movements of this group of touches. On rare occasions players have asked if this could be corrected. The design of the Divorced Low E Mechanism incorporates this. All three of the finger keys move in the same manner.

One of the most common adjustment problems of contrabassoons is the adjustment between the lower vent key and the low E key. It is common to see extra cork or other materials added to the link between the two keys in order for the lower vent key to properly close the low F tone hole. That link no longer exists with the Divorced Low E Mechanism. The new link to the G key should prove to be more resistant to adjustment problems.

Adding to new and existing instruments

The Divorced Low E Mechanism was added as an option to the Fox instrument price list for 2003. It is now available as an option on all new Fox Contrabassoons.

It is possible to add this option to existing Fox Contrabassoons. Ideally, the best time to have this type of keywork option added is when other major work is being done and the body is disassembled, but it is also possible to install on an assembled instrument as part of less extensive repairs.

Development history

As mentioned earlier, the original reason for the mechanism was to correct the instability of the octave G♯. The idea for doing this was first suggested to me by Arlen Fast in December of 1998. The special vents system of the Fast System is capable of doing wonderful things, but the existing mechanism connecting the lower vent key to the low F tone hole continued to cause conflicts for the G♯.

Arlen's idea was to add an additional control onto the pad of the low F tone hole that would open the pad when the G♯ was played. To accomplish, this a new automatic mechanism was required that kept the original closure of the low F tone hole when the lower vent spatula was depressed, but then opened it when the G spatula was depressed.

With the addition of this new burden, the Fast System demanded too much of the lower vent key. Its primary duty was to operate a complex automatic vent system while still being connected to the pad on the low F tone hole which was now also controlled by the G spatula.

Two major problems quickly became evident. First, combining the special functions of the Fast System automatic vent mechanisms with a second automatic control mechanism to operate the low F tone hole all operated by a single touch became a horrendous adjustment problem. Second, using a single key to operate two separate automatic mechanisms and coordinating them together resulted in a poor action for this overworked key. Exacerbating the problem was the distance between the vent key and the low F tone hole. With the extra work load imposed on the vent key, a lot of torque was developed in the total length of hinges between touch and pad. The quality of action might have been usable for a prototype but was not acceptable for a working instrument. The first two Fast System instruments were made in this way. Both of them have been changed, and all subsequent Fast System instruments have been made with the Divorced Low E Mechanism.

This early version went through a number of design changes on paper as well as on the first two Fast System instruments while seeking a way to relieve the adjustment problems and provide a good action. The system was too complex and needed to be simplified. Complicated systems are too vulnerable to problems. The early system was always inseparable from the Fast System, however, and the integration with the lower vent key made complications unavoidable.

The change from the overly complicated system to the divorced system began in November of 2001 with the realization that it might be possible to separate the low E mechanism from the lower vent key. By separating the low E mechanism from the lower vents mechanism of the Fast System, both mechanisms instantly became more practical. In addition, it also became practical to add the new low E mechanism to a contrabassoon without the Fast System. Further refinements were made until the design was simplified to the level of the illustration at the top of this article.

When I was satisfied that the system had been adequately simplified, it was retrofitted on the first Fast System prototype instrument to test the reality of its function. The reality was truly more than I could have expected. It has subsequently been included on new instruments as an option and retrofitted on other existing instruments, including my own contrabassoon.

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