

Automatic low C \sharp /E \flat Mechanisms

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There are several mechanisms which have been designed to facilitate the performance of the low C \sharp and low E \flat of the Heckel System bassoon. These are often referred to as low C \sharp /D \sharp trill keys or low E \flat /D \flat trill keys. The term "articulated" may also be part of their name.

The basic problem is that rapid and repeated movement between these two keys by the player's left little finger is difficult. The objective of these special mechanisms is to reduce the work load of the left little finger by transferring some of it to the left thumb.

Reverse Sprung Mechanisms

All of these mechanisms are based on reverse sprung mechanisms. These are mechanisms that are used on keys that are normally sprung closed. Both the low E \flat and the low C \sharp are normally sprung closed.

Normally, a closed pad key will be held closed by a strong spring acting directly on the pad. If a separate spatula key exists it is likely to have only a light spring holding it against the pad key. The low C \sharp key is an example of a key closed key with a separate spatula key.

In a reverse sprung system the springing is reversed. The closed pad is lightly sprung open and the spatula that opens that pad is heavily sprung and connected to hold the pad closed. If the pad and spatula are normally all part of a single key they must be separated. For instance the low E \flat key is normally a single piece key. It must be changed so that the pad and the spatula are on two separate keys.

The next feature of these mechanisms is the alternate closure key. This is normally, but not always, the key operating the next open pad below the closed pad. This closure key must be linked to the pad in a way that both the closure key's own pad and the pad of the reverse sprung key can be closed simultaneously. Often a new rocker key is required to make this connection.

The mechanism is operated by depressing the normal spatula allowing the pad to open. When the closure key is depressed both pads are closed simultaneously. The normal spatula can remain depressed and the closure key will close the pad anyway.

As an example, the low E \flat key would use the low C key as a closure key. When the low E \flat spatula is depressed the E \flat pad would open. Depressing the low C key would close both the low E \flat pad and the low C key pad. A trill between low C and E \flat would then be possible by holding the E \flat spatula depressed while trilling the low C key.

The Low E \flat Key

As already mentioned the normally one piece E \flat key must be changed so that the pad and the spatula are separated.

The pad key is completely new. This key is mounted as a cross-hinged key. The position of the tone hole does not change. This key is sprung lightly to open itself.

To the E \flat spatula key is added an arm that extends over to the pad cup to hold the pad closed. This spring must be

strong enough to hold the E \flat pad closed until the spatula is depressed.

The low C key serves as the closure key and connects to the E \flat pad through a rocker key. When the E \flat spatula is depressed, allowing the E \flat pad to open, depressing the low C key will close the E \flat pad.

The Low C \sharp Key

Since the low C \sharp key is already made in two parts the problem of creating a second key is eliminated. Normally, the spatula is lightly sprung while a strong spring on the pad key holds the low C \sharp pad closed. This needs to be reversed. To do this the connecting links between the spatula hinge and the pad key hinge must be reversed. Also the springs are changed so that the pad key is lightly sprung open while the spatula is strongly sprung to hold the pad closed.

The method of alternate closure is a more complicated problem for the C \sharp . In a normal reverse sprung mechanism the key operating the next lower open tone hole is used to close the pad. That is, the low B \natural key would be used to close the C \sharp pad. This doesn't satisfy the most common reason for adding this mechanism to a bassoon.

The most common reason for adding the automatic low E \flat /D \flat mechanism is to trill between those notes. If the C \sharp pad were controlled by the low B \natural key it could not be easily used to play the low E \flat /D \flat trill. There is an exception to this condition that will be discussed later.

The most common way of making this mechanism uses the low C key to control the low C \sharp pad. An arm extending from the side of the low C key lifts an arm on the low C \sharp pad key to prevent the low C \sharp pad from opening until the C key is depressed.

This method of connecting the low C \sharp to the low C key creates the biggest negative of this system. Because the low C \sharp pad cannot open until the low C key is depressed it is impossible to open the low C \sharp independently for use as a resonance key. There are ways around this but not without creating new problems. In general, any player who insists on using the low C \sharp as a resonance key should avoid automatic low E \flat /C \sharp mechanisms.

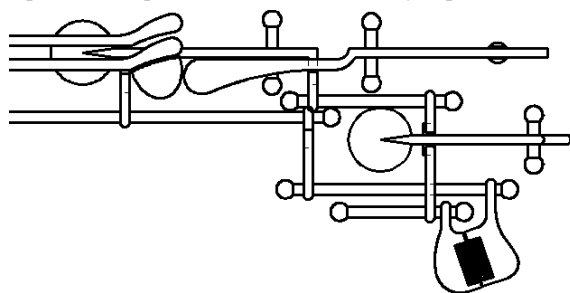
On the positive side of the ledger this method of connecting the low C \sharp to the low C key creates the truest sound from the low E \flat . Any attempt to trill between the low E \flat and C \sharp must involve holding both of those keys depressed. If the mechanism does not close the low C \sharp key when the E \flat is played the sound will be abnormal. Because this mechanism of controlling the C \sharp with the low C key the sound of the low E \flat will be optimal.

One Spatula Or Two

The E \flat and C \sharp systems that have been described so far can be operated with the two familiar and separate spatulas or they can be operated with a single spatula that serves both keys.

When the system is made with the two normal spatulas it is sometimes necessary to depress both spatulas at the

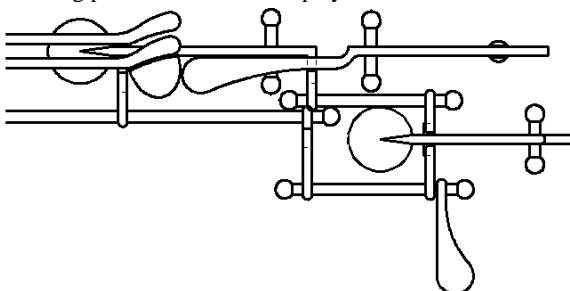
same time. In particular, a trill between low E \flat and low C \sharp requires both spatulas to be simultaneously depressed.



Double Spatula low E \flat /D \flat Mechanism

Combining the two spatulas into a single spatula will make no difference to the functioning of these mechanisms. Whether there are one or two spatulas, it is the position of the low C key that determines which note will be played.

The mechanism with a single spatula creates some interesting possibilities for some players.



Single Spatula low E \flat /D \flat Mechanism

Having a single spatula to play both notes can mean that the longer reach to the low C \sharp is not needed. While this is not usually a problem for most players, the addition of a little finger whisper key changes the conditions significantly. For many players the long reach to a little finger whisper key is simply too much. By having only a single spatula for both the low E \flat and the low C \sharp the little finger whisper key can now be placed in an easily accessible position.

The desire for an easily accessible little finger whisper key is probably the best reason for having a single spatula low E \flat /D \flat mechanism. But it is not the only reason.

Second Low C \sharp Tone Hole

One of the methods for restoring the use of the low C \sharp as a resonance key is to add a second low C \sharp tone hole. This second tone hole is placed close to the normal hole. In order to operate this second hole the regular hole must be operated with a single spatula low E \flat /C \sharp key. The new tone hole is then operated by a second spatula placed in the same position as the normal C \sharp spatula and the keywork is essentially identical to the normal C \sharp mechanism.

In general, this is not a highly recommended mechanism. The hinging for the two spatulas is not normal and the keys will not function as well as they would normally function.

The Cuciureanu Low C \sharp

This design for an automatic low C \sharp key was used by the Romanian bassoonist George Cuciureanu as part of his key system. The automatic E \flat is made the same as described above. It is in the way of making the automatic low C \sharp mechanism where the Cuciureanu system differs from the other mechanisms.

There are two important differences compared to the C \sharp mechanism described above: 1) the low C \sharp pad is closed by the low B \flat key and 2) the low D and the low C keys can be closed by keys for the right hand thumb.

Using the low B \flat key as the alternate closure key is next lower open tone hole. This allows the low C \sharp to be opened independently making it available as a resonance key. But as previously described the use of the low B \flat key creates new problems. These problems are partially overcome by the use of the low D and C keys for the right thumb.

By using the right thumb to hold the low D or low C key closed the left thumb is left free to operate in a new more flexible manner. For instance, a low E \flat /D \flat trill is played by depressing both the low E \flat and low C \sharp keys together, holding the low D key closed with the right thumb, and trilling the low C key with the left thumb. It is not necessary for the left thumb to make any lateral sliding movements between the low C and D keys. Similarly, a low B/C \sharp trill is possible by holding the low C \sharp depressed while holding the low C key closed by the right thumb and trilling the low B \flat key with the left thumb. This is a trill that is otherwise impossible.

With this system there is no trill in the low end of the bassoon that is impossible! But they are not all perfect.

The biggest problem musically with this system is that the low C \sharp pad must remain open while the E \flat is played during a low E \flat /D \flat trill. This causes an abnormal tone for the low E \flat . Mechanically, there are several problems. Making and maintaining the right thumb low C and D keys is very difficult. And all five pads of the bass joint must be adjusted to close perfectly together.

It should be noted that the automatic low E \flat /C \sharp keys can be separate from the low C and D spatulas for the right thumb. However, the greatest use of these mechanisms is when they exist together.

Summary of the Systems

To summarize, there are four different systems that can be described as automatic low E \flat /C \sharp systems. They are:

- Two spatula low E \flat /D \flat trill mechanism
- Single spatula low E \flat /D \flat trill mechanism
- Single spatula low E \flat /D \flat trill mechanism with additional low C \sharp resonance key
- Cuciureanu automatic low E \flat /C \sharp mechanism with right thumb low C and D keys.

In general, the first two mechanisms will be the most commonly seen; the last two would be considered unusual.

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