FLUTE FAMILY

INTRODUCTION TO THE INSPECTION OF WOODWIND INSTRUMENTS

by Lars Kirmser

In a commercial repair environment, it is most common for an instrument to be presented to the repair technician with the customer's ready-made opinion of the problem at hand. These lay observations are, more often than not significant, but we must always keep in mind that the customer is, after all, untrained and their observations may only be only the tip of the iceberg. It is for this reason that the technician must approach each inspection and subsequent testing of a musical instrument from an organized and systematic point of view. Naturally, this process will be critical to the accuracy of your cost estimate, and will be the case in a non commercial environment as well.

Furthermore, when an instrument is presented to you for a *playing condition only* repair, it is my recommendation that you approach each instrument with the intent that ALL necessary repairs required to put the instrument into acceptable playing condition will be performed. Adopting this as a strict shop policy will often save you from annoying return trips by customers who may have initially insisted that only a limited amount of work be performed on their instrument. Adhering to this policy will help to insure your shop's overall reputation for quality and professionalism as well as to increase your total revenue.

Upon preliminary inspection of an instrument the particular problem(s) at hand may be very obvious to you, surely many repair tasks will fall into this category. It is advisable however, for you to get into the habit of following an organized system of checks and balances in your initial evaluation. For more complicated situations, one method would be to utilize an instrument inspection sheet. By employing an inspection sheet the technician is able to note problems quickly and accurately without having to depend largely upon their memory. This method is particularly helpful when a client defers the repair until a later time. After all, it is important to be able to recall your (or your fellow tech's) **exact** recommendations and estimates.

The inspection of musical instruments will consist of two cooperative aspects. These are the *visual inspection* and the *physical inspection*. The visual inspection obviously consists of finding those necessary repairs through visual recognition, whereas the physical inspection entails the manipulation and actual playing of the particular instrument through a series of prescribed test patterns.

To be able to physically check ones repair work, it is **absolutely** necessary that the technician be able to produce an adequate tone on the instrument being checked. Furthermore, the inspecting technician must be thoroughly familiar with the fingerings required to physically check the various combinations.. The person play-testing an instrument **must** not only be able to play a chromatic scale (rapidly ascending and descending) through the first two octaves of the instrument, but they must be able to verify the regulations and adjustments of all fingerings involving combinations of keys and levers on that instrument. It is **only** after having acquired these performance skills, and after having an adequate knowledge of the mechanical and acoustical qualities of an instrument that one is able to repair that instrument to the complete satisfaction of a discriminating musician.

It will be to your distinct advantage to logically combine the visual inspection **with** the physical inspection. It is very common for the neophyte technician to repair an instrument in an illogical sequence. This of course, results in much redundancy and an overall ineficiency. In the training student technicians, it has been my observation that most are inclined to try to blow-test an instrument long before it is adjusted-out thoroughly. I think that many hope to get lucky and will save time in the long run. As it turns out, you will probably spend 50% more time chasing mistakes that could have been avoided by following a prcise and disciplined plan. As one becomes more and more familiar with the mechanical **and** musical aspects of a particular instrument, the more able one is to successfully combine the visual inspection with the physical; this, pf course, requires experience and practice.

FLUTE/PICCOLO INSPECTION

Without question, each member of the woodwind family has its own unique problems. We will begin our discussion of woodwind inspection technique with instruments in the flute family.

In as much as the flute and piccolo are very closely related, the techniques used to inspect and repair the two are in many instances unique. Furthermore, to be specific when addressing **all** flutes and **all** piccolos would be an impossibility. Therefore I must rely somewhat upon the experience and intuition of the reader when describing the following tests.

Today, almost without exception, builders of flutes, will manufacture them in three distinct sections. Those sections being the **headjoint**, the **main body section**, and the **footjoint**. Piccolos will normally consist of only two sections: the **headjoint** and the **body section**. Depending upon the specific requirements and desires of the musician, both flutes and piccolos may be manufactured with a variety of mechanical and physical variations. Nevertheless, with all these many variations, the technician is responsible to see that certain common aspects of all flutes and all piccolos conform to precise industry standards.

PHYSICAL INSPECTION

The primary purpose of the physical inspection is to run the instrument through a series of recommended test patterns to locate problems not discovered and corrected by the visual check. It is the physical inspection that ultimately lets the technician know if the instrument does as it was designed to do by the manufacturer. Obviously, the instrument must be fully assembled to perform the following tests.

When testing woodwind instruments the technician must forever bear in mind that an unnaturally **light touch** is essential. Surprising as it may seem, musicians are usually terrible at testing their instrument of choice. They will usually try to test an instrument using routine performance techniques, so don't make the mistake of having one test your work. The unnaturally light touch and specific fingerings technicians use to check an instrument are unlike the touch and fingerings used by the trained musician. The tech's philosophy is: If an instrument functions properly with the lightest of touch, we may then depend upon its facility to operate whatever the touch a particular musician may use. The pressure required to close a key and completely seal the tone hole (assuming of course that the pad is in acceptable condition) depends primarily upon three major factors:

- Properly centered and leveled pad(s)
- Carefully regulated combinations
- Spring tensions

If the pad is not in acceptable condition, a decision must be made in terms of the extent of the repairs to be made. If only a few pads need be replaced, and then the repair operation need not be extensive, however if most of the pads show definite wear, a complete repad-job, or even an overhaul may be advisable.

The first factor, and likely the most important, is making sure that all the pads are level and seat uniformly upon the tone holes. If newly installed pads are leveled carefully prior to the seating process, this problemmayl usually be avoided. Be careful at this point to distinguish between improperly seated pads and those that are simply maladjusted (combinations). To locate hidden leaks in the pad seat, utilize your feeler gauge. Avoid depending solely upon the use a leak light on flutes and piccolos as they are virtually useless with skin pads.

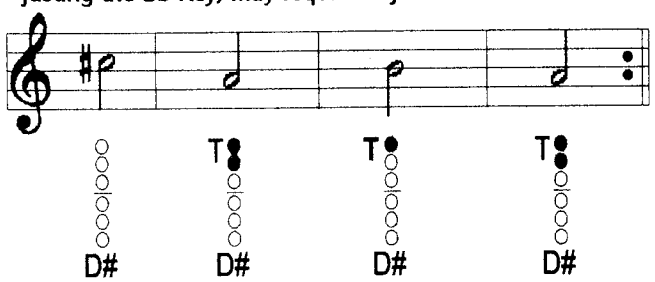
Secondly, if after checking the pads for leaks, the technician still must squeeze the keys slightly to get a tonal response, the problem may lie in the regulation of the combination adjustments. By using a thin mylar feeler gauge on the combinations, the technician is able to regulate them so that all keys involved will close uniformly. If one or more of the combined keys closes prematurely, it will require that the musician use excessive pressure in order for the instrument to respond easily.

Thirdly, we must check the spring tensions. A good rule of thumb is to use only as much tension as will cause the action to respond crisply and with resilience. When the key or lever is released it should follow your finger away no matter how quickly you may release it. In addition, the tensions must be balanced with respect to one another. Do not install excessive tension such that the keys resist closure and affects the overall flexibility of the instrument. Experimentation will reveal that one is able to attain this resilient action without having to use excessive spring tension.

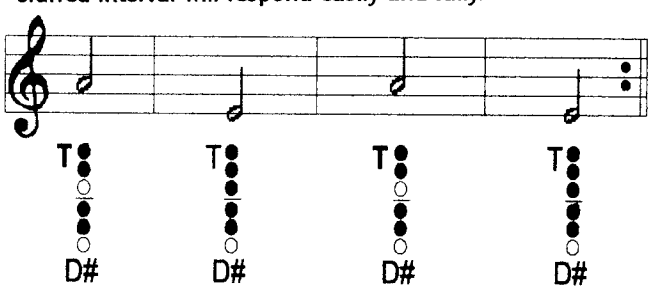
RECOMMENDED TEST PATTERNS

Each of the following tests are designed to check a specific aspect of the flute's key mechanism and individual key adjustments. If you inadvertently overlook mistakes during your final assembly and visual inspection, you will more likely catch them while performing the play test patterns. The following test patterns are by no means the *only* way to locate and correct specific problems, however, after many years I have found them to be quite helpful in locating otherwise hidden errors. With the exception of those tests involving the low C#, low C, and the low B, all patterns will apply to most piccolos as well. When performing the following test patterns try to bring the tone quality and intensity to its highest limits **while maintaining a very light touch.**

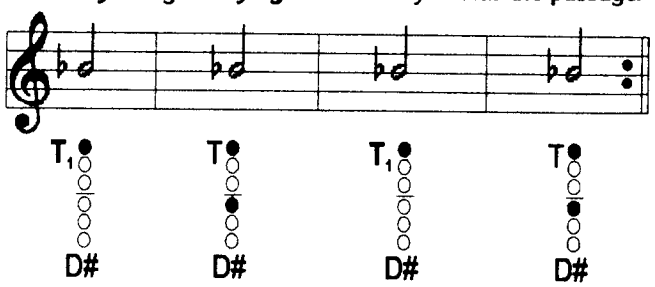
1. This check is concerned primarily with the adjustment of the **A & Bb keys**. If the A is stuffy or generally hard to get, the adjustment screw on the A key of the left-hand section (adjusting the Bb Key) may require adjustment.



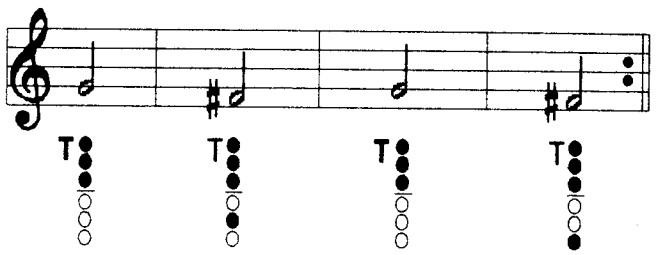
2. The following pattern requires that the tester use an alternate fingering. On this test the technician will determine the adjustment of the **G – G# (double) key**. This pair of keys is not equipped with an adjustment screw normally, so the technician must adjust them by carefully bending the keys so that they are both on an exact level plane. If after leveling the keys, small leaks persist, you may have to re-drift the individual key pads or use the pad shimming method to remedy these small irregularities. When you perform the following test, you must open and close the G – G# key (only) while the two fingers (F & E) of the right hand remain closed. When this G - G# pair is in adjustment, the tones of the slurred interval will respond easily and fully.



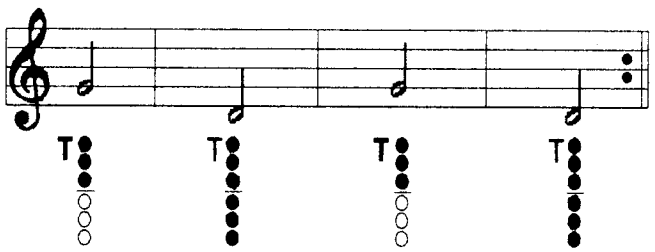
3. This pattern will test the auxiliary **Thumb Bb** Lever adjustment with respect to the **B and Bb keys and the 1 – 1 Bb fingering.** As with all of the following checks play the notes **slowly** using a **very light touch** as you **slur** the passage.



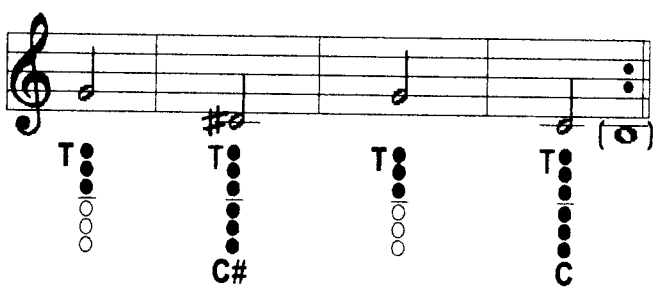
4. This pattern is designed to verify that the E to F# and D to F# combinations are in adjustment. The tester will play G while actuating the E Key only (voicing F#) and the D Key only (also voicing F#) alternately. Do not employ the Low D# key.



5. The pressure required to close the three keys of the right hand must be **very light** and **very even.** This next test is of great importance, since the adjustment and overall response of these keys are critical to the total response of the instrument. When in correct adjustment, the Low D will respond easily and fully as all three right hand keys are closed gently and simultaneously.



6. This test pattern verifies that the Low C and C#, and Low B (opt.) are in correct adjustment. When actuating the Low C, press on the *Roller* part of the key only.



7. The final test will be to play (slur) a rapidly ascending and descending chromatic scale between low C and the C above the staff. This pattern will expose both sluggish key action and uneven spring tensions.