Presented at Minneapolis Acoustical Society Meeting, Fall, 1984.

**WHY USE “PLAYING EXPERIMENTS” RATHER THAN (OBJECTIVE???) LABORATORY DEVICES TO MEASURE THE $f_2/f_1$ MODE ALIGNMENT?**

1. Because of the history of the subject in Cleveland.

2. To take care of certain phenomena that are inaccessible in the lab.

3. To check and/or disclose new scientific subtleties.

4. To provide dependable methods useful to the craftsman.

5. Because nothing is conclusively studied outside its natural habitat — To play well is the ultimate purpose of a musical instrument.

SOME HISTORY (ETC)

1966-67 becoming possible to calculate normal mode frequency ratios quite accurately, including bore pert., thermal effects and overall reed corrections. General correlation of alignment with playing quality was known.

By 1967 possible to calculate alignment errors and their corrections to useful accuracy. Trial of calc. corr.: always made instrument play better. Conditions of player test: not specifiable. AHB could do it but not teach it.


1975+ Reed-resonance precisely understood. Playing experiments progressively:

1) Better definable
2) Better interpretable
3) Better teachable

HENCE TODAY
1. CLOSED TONE HOLES  2. OPEN TONE HOLES  3. BELL FLARE  4. BOUNDARY LAYER  5. REAMING OF UPPER BORE (BOEHM, CONE—OEHLER, CYLINDER)  6. REGISTER HOLE

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7. REED DYNAMICS AND MOUTHPIECE CAVITY
FOR EACH NOTE IN THE CLARION REGISTER SCALE

(1) Play always at mf level with good firm uninterrupted blowing pressure.

(2) Slacken or tighten embouchure tension to get full, centered, tone. That is, align the reed resonance frequency fr to some (any!) harmonic of the played note.

(3) Verify the correctness of setting (2) by dropping the register hole closed while sustaining the tone. If (2) is ok, the pitch will drop a little but the tone will continue clear and steady. Too tight or too loose embouchure will let the note drop to the low register when the register hole closes.

(4) With fr properly set via (2) and (3), and the register hole closed, momentarily touch the reed tip lightly with the tongue. The pitch will fall to the low register note.

(5) Record the pitch names of the tones produced before and after tonguing. The air column f_2/f_1 ratio is given quite accurately by the musical interval.
CHOTTEAU ISOSPEC

REED-RES ONLY
COMPL MPC
PRESENT STATUS

1. For clarinets (of all sizes) the procedures outlined are precise, dependable, teachable, useful.

2. Closely similar techniques are known for the saxophone family (where phase-null method is useless).

3. Related methods exist in developed form for bassoon. In fairly good form for oboe.

4. Brass instrument alignment procedures are easier, and equally dependable.

5. Cousin-procedures for flute have been useful for some time.

1, 2, 3, 4, 5 have all been taught usefully to one or more craftsmen and repairmen.