

Requirement Specification

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1 INTRODUCTION

This document describes the requirements for a piano accordion having a lighter weight than existing commercial accordions but retaining the quality of sound and the ease of playing of a top quality accordion. Provision may be made for the design to support the requirements for the button accordion.

Accordions made by traditional methods are sufficiently heavy to cause problems to players. The problems are caused by the amount of weight that is supported from the shoulders which can cause problems with joints and muscles. A further problem is the logistical problem of transporting such a heavy and unwieldy instrument.

2 PROPERTIES TO BE ADDRESSED IN A NEW PIANO ACCORDION

- Weight
- Size
- Unwieldiness (ergonomics) due to an outdated casing design which makes it very difficult to hold, control and get the most subtle music out of.
- Ladies models vs gentlemen's models. . . (all the current designs are designed and marketed by and for men. Models designed pre c.1950 included designs for women with slightly thinner keys on the keyboard, more petite casing, lighter versions, none of which seemed to compromise on the sound).
- Size of bellows casing, both in width and how far it stretches out.
- Action of the keyboard and bass buttons.
- Action, accessibility and silencing of couplers (switches on both the melody and bass side which allow different banks of reeds to sound together at any one time as in musette, single reed etc).
- Comfortability of the back of the accordion which rests on the body.
- Reed and sound quality. Possibility of a set of Eb reeds on the melody hand and also better bandoneon reed possibility on the melody hand.

3 SPECIFICATION OF THE SET

3.1 General concepts

1. The playing techniques will be identical to traditional accordions.
2. The size and general shape will follow accepted "normal" accordions.

3. The design will be robust.
4. Component design will be rationalised for economical manufacture.
5. Hand fitting and adjustment will be minimised. The design will allow for customisation.
6. Total part count will be kept to a minimum.
7. Damaged or defective parts will be replaceable without special tools or skills.
8. Reeds will be readily available as “service replacement” parts for the life of the instrument.
9. Reeds will be easy to fit without special skill.
10. Commercial components will be used where feasible i.e the bellows and/or the reeds.

3.2 Materials

1. All materials will be safe and not brittle, toxic or sharp.
2. Materials will be available in suitable form i.e. rod and sheet
3. Any natural materials must be sourced from sustainable resources.
4. Air containment materials should maintain an airtight condition without additional treatment

3.3 Weight

1. The target weight of the instrument should be less than 7kg
2. The centre of gravity (cg) of the instrument shall be as close to the back (supporting) face of the accordion as possible and no more than [?]mm in front it.

3.4 Playing pitch

1. The accordion will play at A = 440Hz

3.5 Accordion Treble Keyboard

1. The number of treble keys will be 34
2. The treble range of the instrument will be F below middle C to D, 2 octaves above middle C

3.6 Accordion Bass Buttons

1. The number of bass buttons will be 72 or 80, depending on how much this affects the overall weight.

2. I would like a 'high' bass register and a 'low' one which is usual for this size of accordion. I would like the bass reeds found in a Guerrini accordion as they, for me, have won hands down over every other accordion I have tried. *Guerrini have recently gone bankrupt but we can find out from Allodi where to source the bass reeds.*
- 3.
4. The arrangement of the bass buttons will be the standard 72 or 80 -button Stradella layout (see appendix 1).

3.7 Accordion voices

1. The accordion will have 3 treble voices. . .single, double (light mussette) and 'bandoneon' or 'organ' sound.
2. Controlling the voices will be the same as the "normal" method used by commercial accordions. unless we can come up with a simpler mechanism which changes the voices (allows the vents to open the reeds in order to sound) and also the design of the 'couplers' themselves. Couplers are the switches that set the mechanism off to open the vents.

Usually, on the accordion I am wishing to redesign, there are 4 or 5 treble couplers and 2 bass. The bass are usually for one lighter / higher bass sound and one for the deeper /lower bass sound or register. The melody hand ones always have a single reed sound, a mussette (double reed, whereby one reed is tuned wetter or more out of tune than the other, thus giving a wobble in the sound associated with Jimmy Shand or mussette). Then there can be a low (one octave lower) single reed sound and then one sound which is all reeds sounding together. They are sometimes called 'clarinet or oboe' for the single reed sound, 'bassoon' for the low reed sound, 'musette' for the double reed sound and 'master or organ' for the full sound. All of which is misleading and silly as none of the sounds are anything like any of the descriptions. These words are often written on the couplers themselves.

It is a little but not unimportant bee in my bonnet that having such descriptions on the couplers feeds into the idea that accordionists are deaf and stupid. . .

Anyhow, I have just (22nd May) tried out my student in York's brand new Pigni and have taken photos. No words on the couplers and instead of having the information of which reed sound it is on the front of the coupler, where the player can't see it while playing (there are formal symbols to show this which I can draw for you, fairly simple and self explanatory in design), the info is minimal and slightly on the side of the coupler facing upwards towards the player's face.

This is a good improvement except that the couplers, then, need to be slightly staggered in height as they go down the keyboard, otherwise the player still can't see, without leaning forward, which coupler is which. For advanced players, one gets to know the position of the coupler of course, but that doesn't help beginners

nor half my middle aged students who, because of life long nerves, will always need to look at where their fingers need to hop off the keyboard to, in order to change the voicings in the middle of a piece of music! Some have said to me point blank that they won't even try to change coupler because they know they will hit the wrong coupler. . .and when I have been playing different boxes recently, there is never a standard (grrrrr) order or couplers, so I carefully stick small white squares on the mussette and single reed couplers to help me locate these changes at speed.

You are right, not only are accordions designed by non players, but also for the very very advanced only. What they are missing is that there is a whole world of retired wannabee accordionists who have disposable income to spend on a good accordion and are willing to spend between c.£4k and £10k!

3. These details and weight are very important.

3.8 Reeds

1. Accordion reeds will be in tune at a playing pressure of [?].

NOTE "in tune" will need to be properly specified. See appendix 1 for a first pass.

3.9 Key weights

1. The force required to move the key will be between 55gm and 70gm.
2. The inertial weight of the key will be less than [?]gm.

3.10 Bellows

The bellows are made from pleated layers of cloth and cardboard with added leather and metal. The frames of the bellows, usually made of wood, are glued to the bellow and fit inside the body of the accordion with a thin gasket between the frame and the body to create a seal, usually held in place by pins but sometimes screws.

3.11 Target cost of manufacture

1. The cost of manufacture shall be <£700 based on a selling price of £1500.

This selling price is what I would feel reasonable for such an instrument and undercuts all the accordions currently on the market (of similar size and range) by about £1k.

4 APPENDIX 1 BASS TUNING

Stradella Bass System - is the standard layout on the bass side of most piano and chromatic accordions, it uses columns of buttons arranged in a circle of fifths; this places the principal major chords of a key (I, IV and V) in three adjacent columns. Each column contains, in order:

The major third above (or minor sixth below) the root ("counter-bass")

The root note

The major chord

The minor chord

The dominant seventh chord

The Diminished seventh chord

The following chart shows a standard 120-button Stradella layout.



5 SOME IMPORTANT QUESTIONS