



BALDWIN TECHNICAL SERVICE

Downbearing with the Accu-just System

Notes on Downbearing

- Downbearing is the amount of force that the strings exert against the bridge.
- The 1" long Accu-just hitch pin protrudes $\frac{1}{2}$ " above the plate.
- The string should be no higher than .375" above the plate.
- The hitch pin is set at a 1°-2° angle.
- The hitch pins are designed to withstand a 5700 pound load.
- The Baldwin grands are designed to produce sound at their fullest with a minimal downbearing. Our pianos are designed to operate best at approximately 70% of the bearing of most other models. Excessive downbearing can distort the crown of the board which may degrade the tone and the sustaining power of the piano.
- Adjustment of bearing is equal to pitch raising or lowering a piano. Tuning stability will be affected for a period of time. It is recommended to contact the Technical Service Department before attempting to adjust bearing.
- Adjusting the bearing on one or two strings will not affect the instrument or act as a general cure for poor tone, buzzing, or other ailments that are sometimes associated with bearing. The picture of bearing must be viewed broadly across the entire soundboard, or at least, in sections of the scale.
- The fifth and sixth octaves are the most troublesome area for many pianos. On some occasions, improvements can be made on pianos through the adjustment of bearing in these sections. This is more commonly true of pianos that have been in usage for 15-20 years in variable climates such as institutions or studios. Careful measurement of the bearing should be taken. Occasionally it is beneficial to the tone of the piano to adjust the downbearing with adjoining areas of the scale. Commonly, it is wise to look for gradual changes and consistency in the downbearing on any piano.

Restraining Procedure to Establish Proper Downbearing on Baldwin Grands with Accu-just Hitch Pins.

The following conditions must exist before bearing can be established:

1. String top section first (72-88).
2. Bring up tension tight enough to hold coils working from the top down (to pitch A440 is ideal). Space strings, seat beckets, level tuning pins.
3. Set down bearing to zero in reference to the speaking length.
4. String second section (approx. 54-71) and repeat steps 2-3.
5. String middle section (approx. 27-53) and repeat steps 2-3.
6. Set down bearing on the under strung section to 0.5% in reference to the speaking length starting at lowest note (approx. 27-43).
7. Braid section under bass strings, do not tie braid in section above the over strung section until down bearing is set.
8. String bass section and repeat steps 2-3.
9. Chip piano to pitch or slightly sharp (A440- A446).
10. Check string spacing, coils, beckets, level strings, seat strings to bridge, level tuning pins.
11. Set down bearing starting at the first string above the over strung section (approx.44) and work towards note 88.
12. Zero bubble gauge on speaking length and set string on hitch pin to 1.0%.
13. Be sure to reference on the same string(s) related to the hitch pin you are setting down bearing on.
14. Set top section (approx. 54-88) to 1.5% down bearing.
15. Set bass section to 0.5% down bearing.
16. Braid bass section and finish braid in tenor section.
17. Tune, tune, tune.
18. Note: Down bearing may vary from what was set, resetting is not recommended.

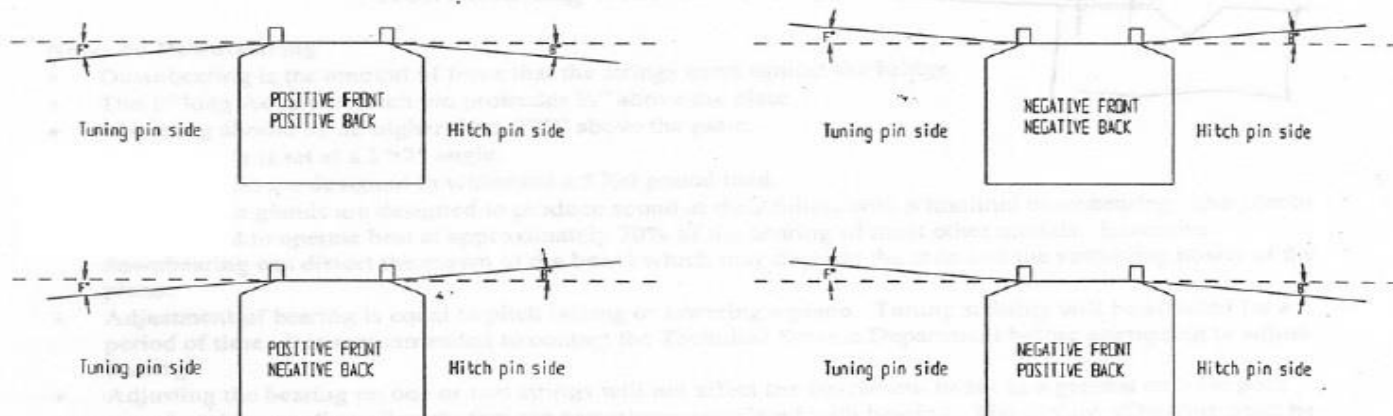
Conclusions

1. Bearing adjustments should only be made when the piano is maintained under proper climatic conditions. Humidity 25%-45% with temperature 70°F-75°F.
2. The procedure and bearing gage must be applied in the order established on the attached chart.
3. A bearing value, previously set, cannot be rechecked because the accumulated force of all strings on the bridges will lower the soundboard crown and reduce the setting which were originally set.
4. Pianos equipped with the Accu-just hitch pins are designed to function with a minimum positive bearing at the bridges compared to other pianos.



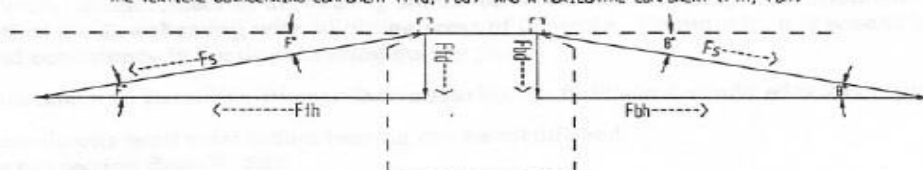
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Downbearing Values, Formulas, and Diagrams



Note: In this situation if $F + B = 0$ then the net bearing is 0%.
All strings must be set to a net bearing of 0% before you start setting downbearing.

USING THE LAWS OF RIGHT TRIANGLES, THE STRING TENSION FORCE (F_s) CAN BE BROKEN INTO TWO COMPONENTS; THE VERTICAL DOWNBEARING COMPONENT (F_{fd} , F_{bd}) AND A HORIZONTAL COMPONENT (F_{fh} , F_{bh})



THREE WAYS OF REFERRING TO DOWNBEARING

1. DOWNBEARING FORCE: REFERS TO THE FORCE DUE TO STRING TENSION EXERTED ON THE BRIDGE.
EX: 1.5 lbf DOWNBEARING INDICATES THAT A STRING IS PRESSING DOWN ON THE BRIDGE WITH 1.5 lbf.
2. PERCENT (%) DOWNBEARING: REFERS TO PERCENTAGE OF STRING TENSION PRESSING DOWN ON BRIDGE.
EX: 1.5% DOWNBEARING WITH A STRING TENSION OF 200 lbf EQUALS 3 lbf PRESSING DOWN ON BRIDGE.
3. DEGREES (°) DOWNBEARING: REFERS TO THE CUMULATIVE ANGLE OF THE STRING ON THE FRONT AND BACK OF THE BRIDGE.
EX: 1.5° DOWNBEARING WITH A STRING TENSION OF 200 lbf EQUALS 5.24 lbf PRESSING DOWN ON BRIDGE.

F_s = FORCE OF STRING TENSION

F = DEGREES FRONT DOWNBEARING

$\sin(F) = \frac{F_{fd}}{F_s} = \% \text{ FRONT DOWNBEARING}$

F_{fd} = FRONT DOWNBEARING FORCE
 $F_{fd} = \sin(F) \cdot F_s$

B = DEGREES BACK DOWNBEARING

$\sin(B) = \frac{F_{bd}}{F_s} = \% \text{ BACK DOWNBEARING}$

F_{bd} = BACK DOWNBEARING FORCE
 $F_{bd} = \sin(B) \cdot F_s$

$F + B$ = TOTAL DEGREES DOWNBEARING

$\sin(F) + \sin(B) = \text{TOTAL } \% \text{ DOWNBEARING OF STRING TENSION}$

$F_{fd} + F_{bd}$ = TOTAL DOWNBEARING FORCE

This chart gives the correct downbearing values in percent and degrees for each note in Baldwin grand models M, R, L, F, and D.

	M	R	L	F	D
NOTES	1-26	1-26	1-20	1-20	1-20
% DOWNBEARING ($\sin(F) + \sin(B)$)	0.5%	0.5%	0.5%	0.5%	0.5%
° DOWNBEARING ($F + B$)	.29°	.29°	.29°	.29°	.29°
NOTES	27-44	27-43	21-40	21-39	21-35
% DOWNBEARING ($\sin(F) + \sin(B)$)	0.5%	0.5%	0.5%	0.5%	0.5%
° DOWNBEARING ($F + B$)	.29°	.29°	.29°	.29°	.29°
NOTES	45-53	44-53	41-53	40-53	36-53
% DOWNBEARING ($\sin(F) + \sin(B)$)	1%	1%	1%	1%	1%
° DOWNBEARING ($F + B$)	.57°	.57°	.57°	.57°	.57°
NOTES	54-88	54-88	54-88	54-88	54-88
% DOWNBEARING ($\sin(F) + \sin(B)$)	1.5%	1.5%	1.5%	1.5%	1.5%
° DOWNBEARING ($F + B$)	.86°	.86°	.86°	.86°	.86°