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This is a Moisture Content (MC) gauge for soundboard work. The gauge is unique in that it is a linear expansion gauge, rather than the many versions of differential expansion strip gauges where a cross ply layer bends a pointer strip along a marked scale. The differential gauges, though easy to build, are not particularly reliable in reproducing readings and are easily permanently damaged by excessive humidity levels. I've built and fought a number of them through the years, and was never really satisfied with any of them, so I tried another approach.

This linear gage consists of an 8mm thick cross grain solid spruce strip that rides in a channeled frame so it can expand and contract with humidity changes without stress or restriction. Being unstressed in operation, humidity extremes won't damage it by over compression as they will the differential gauges, and MC readings are read from a large dial indicator that directly measures the cross grain linear expansion of the spruce strip. I've used a gauge like this for enough years now that I'm confident and comfortable with its capabilities and, as a result of inquiries of others whom I've shown it to, have decided to manufacture these for sale to other piano belly shops.

A few points of physical reality:

This is not a broad range MC gage. The length of the expansion strip was chosen to approximate 0.010" on the dial for every 1% MC change. It's not exact, since no two pieces of wood are the same, but it doesn't have to be exact throughout a range. It just

needs to be reproducible at a specific MC target. Whether you rib boards at 7%MC, 3.5%MC, or anything in between, your reading should be as accurately and reproducibly “right on the money” at your target MC as any instrumentation you’ll likely have access to. You’ll have to calibrate the gauge yourself initially, for accuracy at the MC target of your choice, after which you’ll find it very dependable. Accuracy will diverge slightly above and below your target rate, but will be as predictable as the target reading if you take the trouble to map the range out.

To calibrate the gauge the first time, hang it in your hot box with a panel, monitor temperature and RH% (relative humidity), and wait until the gauge needle remained steady with the RH% indicating your target moisture content of the wood. During the process, the panel acts as a moisture reservoir which keeps the gauge from reacting to the heat too quickly, so you can get the system to stabilize at the MC you want. In my case, that's 6%MC. When the panel and gauge in the box had reached that equilibrium moisture content calculated from the RH% gauge and temperature, and the gauges have stopped moving, I set the MC gauge dial to 0.060". If your target MC is 5%, set the dial to 0.050, etc.

Usage:

After you’ve calibrated it to your satisfaction at your target MC, you hang it in your hot box or room with the panels you are currently working with. When your hotbox has been maintaining the stable target MC on the gauge dial for a few hours or overnight, the rest of the wood in the box with the gauge is at a similar MC. You can also monitor RH% in the box if you like, but the gauge will give you a direct parallel of both the MC% of the panel in the box, and the rate of change that is very difficult to determine by calculation and guesswork alone. The nice thing about having the gauge in the box and reading the MC from the gauge is that RH% calculations are unnecessary. An RH% gauge in the box as well is a comforting cross check, but isn't necessary except as a periodic validation of the MC gauge calibration. The gauge supplies a direct analog readout of what's happening in the panel, in essentially real time. The heat level determines the rate of moisture transfer.

While ribbing the board in the shop, I take the gauge out of the hot box and hang it in the vicinity of where the board is being ribbed. This gives me a quick visual indicator of how quickly the MC of the board is changing as the ribbing progresses, which I find very useful. This is something you can't do at all with RH% readings.

About the tool:

I’ve sanded everything down and applied a couple of coats of lacquer to everything but the spruce expansion strip. This is intended to keep the thing cleaner with handling, not a furniture quality finish. So, both Delignit and Baltic Birch plywood being what they are, I recommend that you look the edges over carefully for splinters that might have eluded me before handling it much. Also, the less the spruce strip is touched, the better. It should work for many years with a minimum accumulation of finger oil.

Here is a Moisture Content chart calculated from Relative humidity and temperature for calibration of the gauge at your target MC.

Equilibrium Moisture Content										
	Relative Humidity				Soundboard Range					
	20%	22%	24%	26%	28%	30%	32%	34%	36%	38%
60 °F	4.56	4.92	5.27	5.60	5.93	6.25	6.57	6.88	7.19	7.50
62 °F	4.55	4.91	5.25	5.59	5.92	6.24	6.56	6.87	7.18	7.48
64 °F	4.54	4.89	5.24	5.58	5.90	6.22	6.54	6.85	7.16	7.46
66 °F	4.52	4.88	5.23	5.56	5.89	6.21	6.52	6.83	7.14	7.44
68 °F	4.51	4.86	5.21	5.54	5.87	6.19	6.50	6.81	7.12	7.42
70 °F	4.49	4.85	5.19	5.53	5.85	6.17	6.48	6.79	7.10	7.40
72 °F	4.48	4.83	5.18	5.51	5.83	6.15	6.46	6.77	7.07	7.38
74 °F	4.46	4.82	5.16	5.49	5.81	6.13	6.44	6.75	7.05	7.35
76 °F	4.44	4.80	5.14	5.47	5.79	6.11	6.42	6.72	7.03	7.33
78 °F	4.43	4.78	5.12	5.45	5.77	6.09	6.40	6.70	7.00	7.30
80 °F	4.41	4.76	5.10	5.43	5.75	6.06	6.37	6.67	6.97	7.27
82 °F	4.39	4.74	5.08	5.41	5.73	6.04	6.35	6.65	6.95	7.24
84 °F	4.37	4.72	5.06	5.38	5.70	6.01	6.32	6.62	6.92	7.21
86 °F	4.35	4.70	5.03	5.36	5.68	5.99	6.29	6.59	6.89	7.18
88 °F	4.33	4.67	5.01	5.33	5.65	5.96	6.26	6.56	6.86	7.15
90 °F	4.30	4.65	4.98	5.31	5.62	5.93	6.23	6.53	6.83	7.12
92 °F	4.28	4.63	4.96	5.28	5.60	5.90	6.21	6.50	6.79	7.08
94 °F	4.26	4.60	4.93	5.26	5.57	5.87	6.17	6.47	6.76	7.05
96 °F	4.23	4.58	4.91	5.23	5.54	5.84	6.14	6.44	6.73	7.02
98 °F	4.21	4.55	4.88	5.20	5.51	5.81	6.11	6.40	6.69	6.98
100 °F	4.18	4.52	4.85	5.17	5.48	5.78	6.08	6.37	6.66	6.94
102 °F	4.16	4.50	4.82	5.14	5.45	5.75	6.04	6.34	6.62	6.91
104 °F	4.13	4.47	4.79	5.11	5.42	5.72	6.01	6.30	6.59	6.87
106 °F	4.11	4.44	4.76	5.08	5.38	5.68	5.98	6.26	6.55	6.83
108 °F	4.08	4.41	4.73	5.05	5.35	5.65	5.94	6.23	6.51	6.79
110 °F	4.05	4.38	4.70	5.02	5.32	5.61	5.90	6.19	6.47	6.75
112 °F	4.02	4.35	4.67	4.98	5.28	5.58	5.87	6.15	6.43	6.71
114 °F	3.99	4.32	4.64	4.95	5.25	5.54	5.83	6.11	6.39	6.67
116 °F	3.96	4.29	4.61	4.91	5.21	5.51	5.79	6.07	6.35	6.63
118 °F	3.93	4.26	4.57	4.88	5.18	5.47	5.75	6.03	6.31	6.58
120 °F	3.90	4.23	4.54	4.85	5.14	5.43	5.71	5.99	6.27	6.54