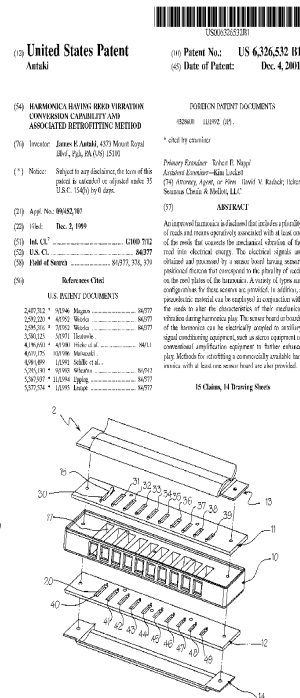


History of the ELX

- circa 1990 – experimental studies on harmonica reed dynamics accidentally results in realization that reed motion when converted to voltage, can then be translated to sound.
- circa 1996 – first piezo electric prototype
- circa 1999 – piezo model is “perfected” however has significant drawbacks. Presented to Hohner, who expressed no interest.
- circa 2002 – eddy current sensor
- circa 2002 – capacitive sensor
- 2003 – patent filed
- 2004 – first prototype using optical sensor using simple passive summer circuit. Worked “ok” but gain was uneven across reeds (very weak for the high reeds) and there was unacceptable hiss.
- 2005 – second optical prototype designed by Tom Dragness including on-board preamplifiers. Sensors changed from Optek to Omron to save cost. This harp was configured as quadraphonic: high register separated from low, draw from blow, patched to mini quad mixer (Nobels.) Drawbacks included complexity, difficulty to replace harp bodies (requiring disassembly of lids), and ongoing problem of hiss.
- 2008 – retained Daedalus to re-design ELX to deal with manufacturability issue and hiss. They redesigned the circuit, and produced 5 prototypes, but not much was changed, except convert from four channel to one (for sake of simplicity, obviating 4-channel mixer.) The manufacturability issue was never addressed.
- 2009-at wits end, Prof Turbodog decides to take matters into his own hands, and redesigns the covers to permit easy exchange of harp bodies. Returns to Daedalus for minor revisions to circuit, particularly replacing sensors which had been discontinued by Omron by Fairchild sensors. Added pot's to each of the reeds to balance gain; Also inverted summation of blow and draw (based on suggestion of Harmonica John) to prevent cancellation when bending notes. Also added on-board connector along with other improvements to improve manufacture, assembly, and adjustment.
- 2011 – retained Novodyne (Burbank, CA) to produce circuit boards.
- 2011, November 7 – first 5 boards arrived. Assembled to 5-sets of rapid-prototype lids to produce the first five “production” ELX's.
- April 2012 – Novodyne loses lease, goes out of business; runs off with our down payment.
- ca June 2012 – we find another supplier of circuit boards, and conduct another round of debugging, and minor revisions.
- August 17, 2012: first set of 100 circuit boards received, full production initiated.
- ...and the beat goes on...



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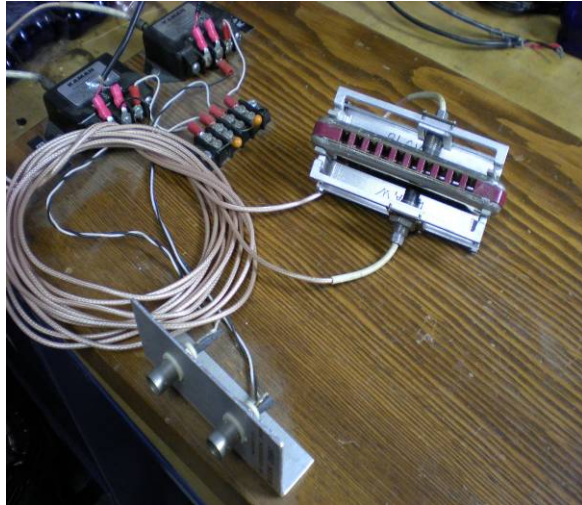
HARMONICAS OF THE FUTURE

TurboHarp/ELX

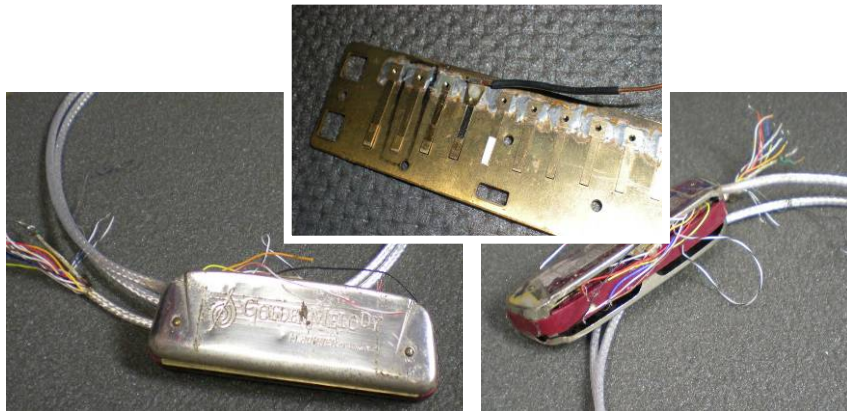


Origins of the ELX

circa 1991 – original “breadboard” version – originally intended for experimentation on physics of reed dynamics. Two eddy current proximity sensors used.



circa 1996: Piezo version: flexible plastic sensors painstakingly bonded to each reed. Wire attachment was a big problem.



circa 2001: Improved piezo version: wire attachment problem “solved” kind-of. But still painstaking, and resulted in unacceptable damping. Note brief venture into using Lee Oskar bodies.



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Origins of the ELX

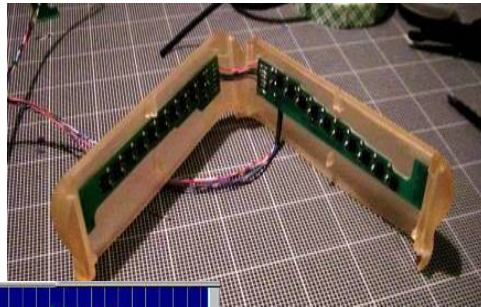
circa 2003: Attempt at proximity sensors integrated into the comb.



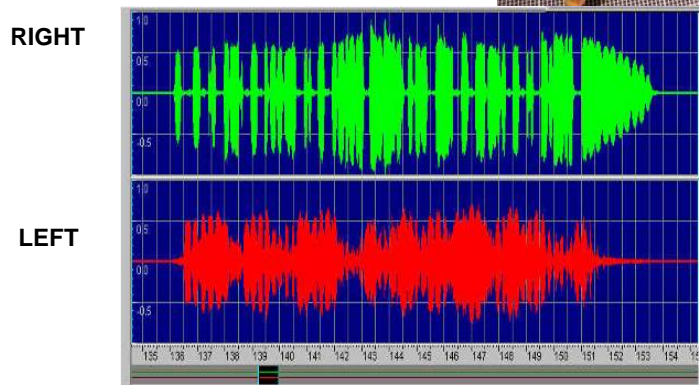
circa 2004: First optical pickup version. 4 channels: low notes blow, low draw, high blow, high draw



- Optical sensors (pickups) convert reed vibration to electrical signal.
- Used standard harmonica body
- Required disassembly of lids (by 2 allen screws) to swap harmonica bodies.



•Quad output: blow-draw; low-high registers



4 channels from harp:

- Low blow
- Low draw
- High blow
- High draw

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Origins of the ELX: Generation-2 Optical - circa 2004



- Experimented with various effects boxes, including Line-6, POD, Pandora Box, Digitech RP50, and RP70, and others.



circa 2004:
refined 4-channel mixer.



circa 2003: Demo CD

