The Denkimono Clock Kit

A retrospective
Inspiration

Octopussy (1983)
Proto-prototype
Comprehensively documented...
Design limitations

• Had to use through-hole components for home construction
  - limits choice of components that can be used, lots of exciting sensors/displays are only SMD
• Low component count for cost/simplicity
• Small board size for cost
**Development**

- Design circuit / production prototype
- Write firmware
- Schematic capture (TinyCAD on SourceForge)
- Design PCB ([www.freepcb.com](http://www.freepcb.com))
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- Schematic capture (TinyCAD on SourceForge)
- Design PCB (www.freepcb.com)
- Prototype PCB (www.pcbtrain.co.uk)
- Source parts and create BoM
- Create assembly instructions
- Create operating instructions
- Create website + storefront

Fun phase!
Sales and marketing

- Inventory
  - Rapid and Farnell are expensive but reliable
  - Futurlec (Thailand) are cheap but flaky
  - Some components had no alternative supplier

- Stuff bags
  - Really tedious after the first 50

- Print postage

- Handle support
  - (90% of supports calls from 10% of the people)

Dull phase
• Initially closed sourced, sold as kits or ready built
  Premium for ready built not enough to justify the effort
  People who buy ready made expect Sony quality and support
  so end up dissatisfied

• Closed design meant support was difficult
  Publishing circuit diagram helped people support themselves
  Publishing code was hoped to stimulate people to develop
  their own applications (but it didn't happen)
Why not open source?

- **Design might be stolen!**
  - But no one did
  - It's a really simple circuit
  - There's no IP, easy to copy
  - If there was a global market then a factory in China would be making them for the world
  - Probably means this won't scale to 1000's

- **Even with the designs and source there's still a barrier to entry**
  - Need to source parts
  - One off PCB is expensive
Why open source?

- People can fix their own problems
- People can learn (everything I learned I learned from the internet)
- People can modify and extend
Why release at all?

- Forces you to make a thorough job of it
  - Well designed circuit
  - Fully featured software
  - Well documented
- People find applications you never imagined
  - rally timer
  - astro photo timer (red colour is good for night vision)
  - paintball 'capture the flag' timer
  - featured in 2 movies
Flikken Maastricht (2008)
Personality Plus (2009)
Sales

- Nearly 60% of customers from the USA
- 20% from Euronordic countries
- 15% from the UK
- Rest from Australia/NZ/Far East
Links

Prototype website: www.frisnit.com
Kit website: www.denkimono.com

'denkimono' = denki (電) + mono (電 = 'electric thing' (maybe))