{gallery}radio/title{/gallery}My university first year physics lab project, 1991. This is a digital clock which receives radio signals on 60KHz fro

m Rugby, central England. The time signals received are encoded with the data and time and synchronised to atomic standard clocks, i.e. its really very accurate. This clock receives the signals, decodes and displays them. I even included an alarm facility. Really all I would have needed to do for the project was to build the radio receiver, plot its output on a chart recorder, and show that I could manually decode the time signal. A 1st year project a few years previously had done exactly this. But, that wouldn't have been any fun, would it! So I built the whole thing. It was very the neat you the way you could turn it on, and the display would show some rubbish. But when the clock had decoded a whole minute's worth of radio signals, the clock would automatically switch to the correct time. I could do that again and again and still receive the same satisfaction.

Unfortunately, I never got round to finishing it properly, putting it in a nice case etc. The only thing which never satisfied me about this project was the radio receiver module. I used a very simple form of Tuned Radio Receiver which was highly succeptable to interference. To make the thing work at all I spent ages designing circuits to clean up the signal and make it reliable. Despite this I never got the time to decode properly in the physics lab. It worked perfectly well in my halls of residence but never in the lab, presumably because of the building's steel frame. I should have used a better receiver, a superhet. One day I will get round to building such a more advanced receiver and even finish the project off by putting it in a nice case.

More information about the time signal transmissions from Rugby can be obtained from the 60 KHz MSF page

at the National Physics Laboratory website (
NPL
). The NPL also have an
MSF Enthusiasts page
with links to other time signal project pages.

The top photo shows the  n loan from the physic

Between one and two minutes later, the clock has received a whole minute's worth of time data and se

I applied some clarifying 

Further plans

The radio receiver was always the weak part of the design in this project. A lot of the construction work was carried out in my student room in South Kensington at Imperial College, London University studying a Physics BSc. The receiver worked fine there but would not function properly in the physics laboratory. There are two possible reasons for this. The physics building was of a steel-framed construction which would've cut down the signal strength arriving at the antenna. Secondly, a large number of foreign embassies are situated on adjoining Queen's Gate, each roof bristling with an array of various aerials which one could speculate caused interference to my poor receiver.

I plan to build a replacement reciever for the clock, and enclose the project properly as a finished item. I will also construct an accurate frequency reference in the same cabinet, which will provide an precise timebase to my frequency counters and other equipment in the shack. I have a 10MHz OCXO module (type HCD71), which will be phase locked to the improved 60kHz receiver. Accurate frequency measurements are very useful in applications such as my 10MHz QRSS beacon
, where the very narrow transmission bandwidths require receiving stations to monitor a small section of the radio spectrum.

Read the report!

When first written, this page displayed a rather poor scan of my handwritten university project report. Written in 1991, this was the last report which I made in handwritten form, before computing resources were common enough to make today's wordprocessed reports possible. In April 2005 I received an email from Korea from Seokwoo, Hur. He has kindly transcribed my handwriting into a much more readable text. THANKYOU! Click here to read the report.

CIRCUIT DIAGRAMS: Please note that I have also made the 5 pages of circuit diagrams for this project available in a high resolution Adobe Acrobat .pdf file, which is 340kBytes big and you may find easier to read than the circuit diagrams on these pages. Click here to download
.

MSF nixie clock project

Finally, be look at this excellent MSF Nixie Clock project by Steve Smith, who built from my basic design with a Maplin MSF receiver module and modified the display driver to use nixies. He also added a snooze facility. It's superb! Read more...