

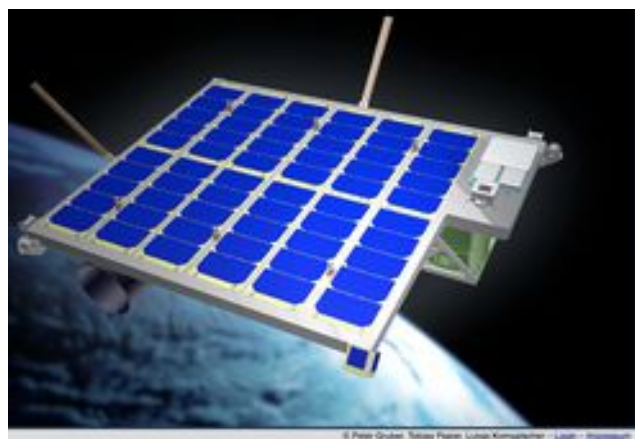
The student voice, right over our heads.

It is fashionable for university academics to be despairing about schools, and to moan on and on about how the Freshers of today know so much less, or are so much less able, than they think they remember themselves being when they arrived at University. I suspect this has been going on since the university system first began, eternally fuelled by the ease with which ‘not the same as’ can be mistaken for ‘not as good as’. Sometimes, though, a bunch of schoolkids does something that is so unmistakably impressive that even the crustiest old professor has to admit that there may be some hope for them after all. I have just stumbled on yet another example of school pupils being really amazing.

If you are reading this on a device with a loudspeaker or headphones, and you click [here](#) (or on the link at the end), you can hear the first hint I had about this. It is a recording of a radio signal that appeared on a radio receiver tuned to 145.960 MHz on the 2m amateur band. Three things about the recording stand out. First, the signal is weak, much weaker than it would be from a nearby radio ham, so it was so low-powered or far away. Second, its pitch falls steadily, indicating a Doppler shift of the kind one hears when listening to a low-Earth-orbit satellite. Third, the signal carries Morse, like a typical old-school satellite beacon. The first group of letters, *di-dit di-dit di-di-di-dah-dah dah-dah di-di-di-dah*, spells out I13MV, and the next group spell out MAX VALIER SAT.

Having not come across this ‘bird’ before, I looked it up on the web. The story of the Max Valier satellite (named after a pioneer of rocketry, killed in 1930 by one of his own rocket engines) turns out to be unusual: much of it was built by school pupils. The pupils are studying at the Max Valier

Technical High-school in Bolzano, in the Italian South Tirol. They built the mechanical skeleton of the satellite and its electronic power supply. Amateur astronomers also played a major role in completing the craft, working with university and professional institutes to make specialized instruments such as an X-ray telescope, also carried on the platform (the instruments transmit data to Earth on another frequency).



The ‘this is not NASA’-ness of the enterprise was further emphasized by the launch, which was

done courtesy of the Indian Space Research Organization. They gave the tiny Max Valier Sat, and a few other small satellites, a ride alongside a much larger satellite atop one of their impressive Polar Satellite Launch Vehicle rockets, which blasted off from Sriharikota in Andhra Pradesh. It has been wonderful, in the last decades, to see the rise of more space-faring nations. But watching their success is bitter-sweet for a Brit: ours is the only nation on Earth that developed and used its own ability to launch spacecraft – the Blue Streak/ Black Arrow/ Waxwing rocket – and then turned its back on the whole idea just as it was working well, and scrapped it. The only British-launched satellite was called *Prospero* when its makers heard that the programme would be cancelled after their launch, presumably because in Shakespeare's *Tempest* Prospero turns his back on the magic he had gone to such trouble to learn. *Prospero*'s unlaunched twin now hangs from the ceiling in London's Science museum; it is, to me, one of the saddest sights in all that City.

Max Valier Sat is by no means the only amateur-built and amateur-run satellite in the heavens, but it is unusual for being to such a large extent built by school pupils. If you have a suitable VHF radio/ scanner, you can hear the satellite for yourself. Look up its orbit (see links for the orbit-calculating website) and tune your radio to 145.960 MHz, CW mode (this mode may may be called 'Morse' or 'BFO' on your radio) a little before the satellite is scheduled to come over. It is best to be outside or, if you are indoors, to make sure that you are not shielded by, for example, a metal roof. As it approaches and passes, you will hear its call sign, II3MV, in Morse: di-dit di-dit di-di-di-dah-dah dah-dah di-di-di-dah, with other Morse following it, in a repeated cycle. The pitch of the signal will fall due to Doppler-shift as its source speeds past, just as I my recording. With more sophisticated equipment, it is possible to decode the data streams from the satellite, which were always intended for amateur use. (Please note, though, that this satellite does not contain a repeater: please do not attempt to transmit to it).

Jamie Davies

Edinburgh

July 2017

Links

Recording: <http://golgi.ana.ed.ac.uk/Davieslab/blog/MaxValier.mp3>

Info: <https://amsat-uk.org/2012/08/13/high-school-satellite-max-valier/>

Info: <https://directory.eoportal.org/web/eoportal/satellite-missions/m/max-valier-sat>