

I believe the S511H, E2V MG5403 1MW coaxial magnetron and associated 511H {Surveyor S2055} modulator sub units to be the ultimate Marconi magnetron radar transmitter design, and is **over 50% Efficient**. The last one designed by Marconi Radar. When I started my radar career, I was working on the **Marconi 'Green Ginger' Surveillance radars**, used with the ARMY Thunderbird II Missile Systems during Cold war, ~ 1969--75; the Alpha and Omega of my working life; not quite, as I carried on with THALES SIX for a further 12 years.

I pulled information from my 511H engineers log books and expanded to make it readable by any radar engineer, and for education purposes.

I designed the 511H Transmitter, built and tested the prototype, which I believe went to Southend Airport, and has provided over 30 years service.

I used Mr Simon Giles {Marconi transmitter engineer} Solid State FET modulator {2MW} design, which he designed for the multi-magnetron EMC Test Set installed at Boscombe Down; the rest of the tx sub units and overall Tx designed by myself.

Thesis also includes my additional educational papers in an Appendix;

and **also an independent 511H performance measurement report by Dr David J. Heath, Systems Engineering.**

I invited the E2V Magnetron designer to witness Jitter test results on my 511H prototype, unique designs and test methods; less than 1ns jitter which had not been achieved before. The secret is in the **air cooled PVCU {Corner Cutter} design** {at the Hartee Voltage transition point on the -34kV cathode voltage pulse rising edge. I eliminated cathode voltage rings on the rising edge by minimising cct inductances} and the '**Digital Magnetron Heater controller**'.

By accident, I discovered the need to continuously and accurately control mag heater voltage {and therefore the volume of electrons hovering above the cathode surface} : I had the 511H prototype operating in HV Test Lab whilst I was measuring Pulse to Pulse Jitter using a 'HP Modulation Domain Analyser', capturing periods of 1000 RF pulses, to display a Gaussian Histogram of Pk-Pk jitter and Standard Deviation {paper included in the document}, and at the same time very slowly varying the cathode heater voltage. I found optimum heater voltage for minimum jitter. So, I then designed a **Digital Mag' Heater loop Controller**, which always maintains best heater voltage vs tx duty for minimum jitter. This of course has great benefit in maximising magnetron tube life.

Marconi transmitter Eng Dept' had not done this previously or used my methods.

I have also photo of my lab 511H tx set up in an old log book.

EMC Factors not mentioned in my Thesis, is that I took opportunity to rewire all modulator wiring and earthing, to reduce induced noise in the receiver and signal processing; to maximise radar MTI performance. Original 511 Tx wiring was horrific bad EMC practice.