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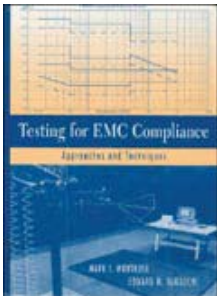

PRAVIN PATEL Reviews **"TESTING FOR EMC COMPLIANCE: Approaches and Techniques"** by Mark Montrose and Edward Nakauchi

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"....a detailed reference to EMC compliance testing."

I have been keeping track of EMC directives coming from the European Commission since the late 1980s. At that time, these were the most complex directives introduced and their many implications meant that they could not become mandatory until 1992. The EC had clearly underestimated the task of implementing EMC directives and hence introduced new amendments to give manufacturers and test houses more time to comply. The directives became mandatory from the 1st January 1996 and development continues, reflecting the changes caused by emerging new technologies. "Testing for EMC Compliance: Approaches and Techniques" by Mark Montrose and Edward Nakauchi is a very comprehensive book that should stand the test of time. It can be regarded as a detailed reference to EMC compliance testing. The authors between them have many years of experience in the field of radio-frequency interference (RFI) and (like me) are old enough to know that the bulk of EMC is mainly RFI in fast edge signals and inter-connects within and externally to the product.

This book is aimed not only at electrical and electronic engineers and technicians in the design or the test department, but also to QA and senior managers in industry who need to make decisions as to why and how products need to satisfy EMC directives. With the information contained in this publication, senior managers can appreciate the problems that design and test engineers face and the QA manager can be fully informed when writing procedures to meet compliance. This is outlined in a detailed test procedure methodology in the second appendix.

"....handles the underlying physics without getting too deeply buried in equations."

Chapter 2 unravels the theory of EMC and would have been very useful in my second year at university that was heavy on mathematics and electromagnetic theory. This book handles the underlying physics without getting too deeply buried in equations. There are two separate chapters that deal with conducted and radiated testing and present basic test procedures and methodology in a clear precise manner and style. In both these chapters emissions and immunity are dealt with. As a design engineer I spend a lot of time solving complex problems during product development and EMC is one of these. This book helps by getting one to think ahead and plan for EMC right from the beginning. It bridges the gap between complicated technical theory that sometimes seems to have little relevance to practical work and the rule of thumb methods that may bring short-term success in the design but leave the problem of compliance still to be solved.

"....information that is easy to understand and implement."

This book should also be of considerable assistance to those poor inexperienced souls delegated to EMC engineering who have the responsibility to tackle failed products because EMC was not considered seriously (or at all) at the design stage. Troubleshooting is both a skill and an art that a test engineer has to master especially if, for example, they do not even know the most appropriate probe to trace the source of noise generated by the product. Chapter 9 tackles this by tying previous chapters together and will be useful for troubleshooting. There are

lots of tricks of the trade designed to save time; some techniques involve building simple gadgets such as sniffer probes. I particularly liked some of the simple solutions such as the use of a remote control toy car to test the quality of screen rooms or a tin-can antenna probe for frequencies used in the "Bluetooth" arena. These examples enhance a highly readable book with information that is easy to understand and implement. There are many books written on this complex subject but the benefit of this book is that it helps to simplify and understand the problems associated with EMC compliance. I especially liked the applied engineering concept along with the hands on techniques in problems solving. The glossary at the back is invaluable when dealing with the many terms associated with EMC, and most of the main definitions are also introduced near the beginning. The authors use their experience in this field and also cite much reference material in the bibliography for those interested in pursuing the subject further. This book will help one to integrate EMC into the design process without adding a large amount of time to the product development process. Doing this will avoid costly delays whilst troubleshooting both in-house and at the testing station. I recommend this book to design and test engineers, preferably in hardback version, as it is likely to be referred to again and again.

Pravin Patel graduated from the University of Bradford with an honours degree in Physical Electronics in 1982. He then joined the Department of Earth Sciences University of Cambridge as a research assistant in the development of Electron Probe micro-analyser with digital backscatter electron and x-ray imaging. He then went on to develop high-resolution secondary ion mass spectrometers with fast switching of magnetic fields. During term time he was a demonstrator in materials science and crystallography. In 1986 he joined the marine geophysics group at Bullard Laboratories in the University of Cambridge as a research associate where he developed the Cambridge Deep Active Source Electromagnetic Sounding system for the study of the structure and the dynamics of mid-ocean ridges. This involved extensive instrumentation development that had to work in harsh environment. This included design and build underwater transmitter with dipole moment of the order of 6000 Am, 8 m long orthogonal dipole underwater receivers. In 1991 Pravin was awarded the Chartered Physicist status from the Institute of Physic.

Pravin left Cambridge in 1993 to become a freelance design engineer. The work ranged from development of instrumentation on secondary ion mass spectrometers, oxygen analysis in medical applications to transmission of digital data using FFSK superimposed on speech using Private Mobile Radios.
In early 1997 Pravin joined H Tinsley and Co. in Croydon as a senior design engineer and his duties included full EMC control on products developed at Tinsleys, design of submarine cable testers, capacitance meters, integrating sphere eye testers, testing of National Grid power transformers, as well as writing large embedded C code.

In August 1998 Pravin joined NPL as research scientist, where he developed products destined for national laboratories worldwide, these included cryogenic current comparators, electronics for Josephson junction arrays, electronics to stabilise reference lasers standards, THz detectors, standard capacitors, and automated inductive voltage dividers. Pravin is currently a higher research scientist and spends sometime in the GTEM facilities at NPL.