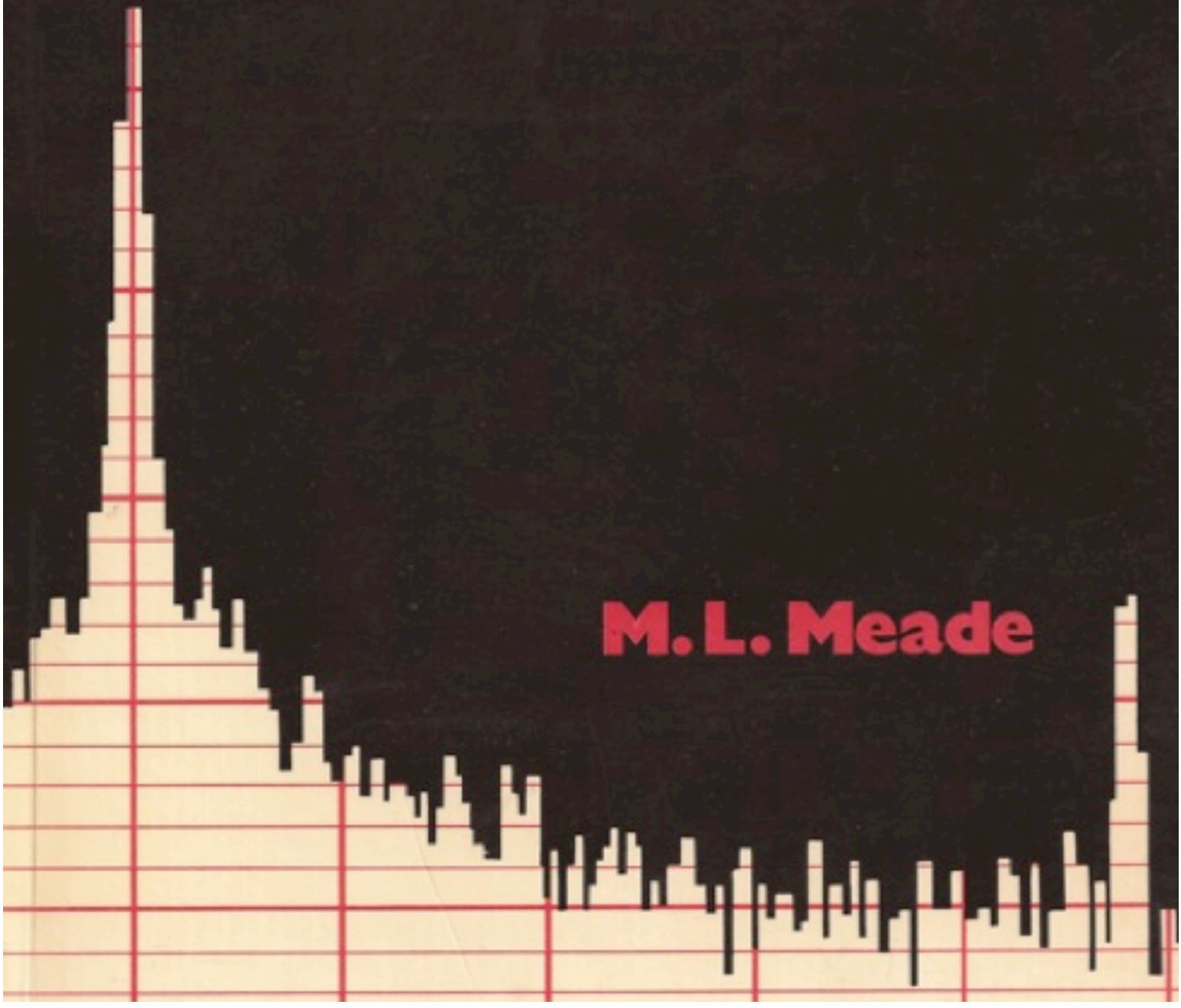
e-edition

Lock-in amplifiers: principles and applications



M. L. Meade

Lock-in amplifiers: principles and applications

M. L. Meade

e-edition

First published in Great Britain by
Peter Peregrinus Ltd, London, UK 1983

e-edition published by M.L. Meade 2013

Contents

The Contents list is for reference only.

Individual chapters can be navigated using the Table of Contents displayed in the PDF sidebar.

Preface

To the first edition

This book has been written for users of lock-in equipment and for those with an interest in the practical aspects of signal recovery and measurement using synchronous detection. The subject matter has been tackled for the most part at a systems level on the understanding that this is the approach most appreciated by research workers whose main specialization is in an area other than electronic instrumentation. Circuit designers will therefore look in vain for detailed circuit implementations; extensive mathematical developments are similarly avoided in favour of a more qualitative approach to identifying the essential features of lock-in detection systems. A basic familiarity with Fourier series and transforms provides adequate preparation for the main part of the text and it is hoped that the review of system configurations and specifications given there will prove both interesting and useful to specialists and generalists alike.

To the e-edition

It is now thirty years since *Lock-in amplifiers: principles and applications* was first published. In the intervening period it has become established as a minor classic, being amongst the most widely cited text books of its kind. Of even greater importance to me personally is that, despite a lapse of almost 25 years since the final printing, I continue to receive requests from researchers and students seeking a copy – hence my wish to create an 'authorised' electronic version and make it freely available.

Unlike the PDF held by Google Books (and numerous plagiarised versions circulating elsewhere) this e-edition has been newly compiled from the original typescript and diagrams. I make no apologies for leaving the content substantially the same as before, with no extensive revisions or additions. This reflects my view that, while there have been significant developments in the technology and implementation of lock-in systems, the greater part of the book, dealing with principles and guides to good practice, remains valid and useful. I might also confess that I am enjoying my retirement too much to spend more than the time necessary to correct obvious mistakes and to improve on the type-setting of equations which was less than satisfactory in the printed edition. There is, of course, the danger that this reworking is prone to fresh errors and, here, I am more than happy to apologise for any difficulty caused and fully prepared to amend and reissue any pages where errors are reported.

Mike Meade
Carlton
Bedford, UK

November 2013

Acknowledgements

From the first edition

The following chapters represent a greatly expanded version of a review article I prepared for the Institute of Physics in 1981[1]. A search of the literature at that time revealed that very little had been written about lock-in amplifiers beyond the technical notes published by the leading manufacturers. The task of writing this book was therefore greatly eased by the co-operation of friends and sometime colleagues at the E.G. & G. companies, Brookdeal and Princeton Applied Research, who made available a wealth of applications material and provided additional information.

At a more detailed level, the treatment in later chapters relating to heterodyne and p.w.m. systems owes much to discussions with Dr. Simon Carter of Hewlett Packard Ltd., South Queensferry. The formulation of spurious responses in these systems follows the lines developed by Dr. Carter in his Ph.D. thesis which is a prime source of reference on all aspects of lock-in systems.

I am greatly indebted to Chris Meredith of Aquarius Electronics, Beaconsfield, for providing a valuable perspective on lock-in systems and providing much painstaking, constructive, criticism on the manuscript. Also, Dr. David Crecraft and other colleagues in the Electronics Discipline of the Open University, UK, provided both assistance and encouragement throughout the writing period. Finally, I should like to make special mention of Christine Martindale and Jane Barden for managing the production of the manuscript.

For the e-edition

The e-edition was made possible by the combined efforts of the secretarial staff in the former Electronics Discipline of the Open University, UK, who undertook the scanning and hand-crafted OCR rendition of my original manuscripts during the summer of 2002. I am entirely to blame for the fact that the resulting files have only now seen the light of day.

[1] References

1 MEADE, M.L. (1982): 'Advances in lock-in amplifiers', J.Phys E: Sci Instrum., 15, pp. 395-403

2 CARTER, S.F. (1982): 'A systems approach to the design of lock-in amplifiers'. Ph.D.Thesis (University of Reading, England)