

Find authenticated court documents without watermarks at docketalarm.com.

Newnes Telecommunications Pocket Book

E. A. Edis, CEng, BSc, MIE and J. E. Varrall, CEng, BSc, MIE

BNEWNES

DOCKET A L A R M Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

Newnes

An imprint of Butterworth-Heinemann Ltd Linacre House, Jordan Hill, Oxford OX2 8DP

PART OF REED INTERNATIONAL BOOKS

OXFORD LONDON BOSTON MUNICH NEW DELHI SINGAPORE SYDNEY TOKYO TORONTO WELLINGTON

First published 1992

© E. A. Edis and J. E. Varrall 1992

All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means and whether or not transiently or incidentally to some other use of this publication) without the written permission of the copyright holder except in accordance with the provisions of the Copyright, Designs and Patents Act 1988 or under the terms of a licence issued by the Copyright Licensing Agency Ltd, 90 Tottenham Court Road, London, England W1P 9HE. Applications for the copyright holder's written permission to reproduce any part of this publication should be addressed to the publishers

British Library Cataloguing in Publication Data Edis, E. A.

Newnes Telecommunications Pocket Book I. Title II. Varrall, J. E. 621,382

ISBN 0 7506 0307 0

Library of Congress Cataloguing in Publication Data Edis, E. A. Newnes telecommunications pocket book/E. A. Edis and J. E. Varrall. p. cm.

Includes bibliographical references. ISBN 0 7506 0307 0 1. Telecommunication – Handbooks, manuals, etc. I. Varrall, J. E. II. Title. III. Title: Telecommunications

pocket book. TK5102.5.E28 1992 621.382–dc20 92–14810

Typeset by TecSet Ltd, Wallington, Surrey

Printed and bound in Great Britain

Contents

C	knowled	gements	xiii
1	Crystal	ls and piezo-electric ceramics	1
	1.1	Quartz crystals	1
	1.2	Piezo-ceramics	3
		References	4
	Electro	omechanical components	5
	2.1	Relays (conventional armature)	5
	2.2	Latching (bistable) relays	6
	2.3	Reed relays	7
	2.4	Mercury-wetted reed relays	7
	2.5	Contact protection	7
	2.6	Manually operated switches	9
	2.7	Electrical connectors	9
		References	13
3	Electri	cal cables	14
	3.1	Voice-frequency (audio) cables	14
	3.2	Coaxial cables	14
	3.3	Data transmission cables	15
		References	15
	Fibre o	optic components	16
	4.1	Fibre optic cables	16
	4.2	Couplers and connectors	19
	4.3	Optical transmitters	19
	4.4	Optical detectors	20
		References	20
	Transd	lucers	21
	5.1	Loudspeakers	21
	5.2	Microphones	21
	5.3	Telephone handset	22
	5.4	Hall effect devices	23
		References	23
1	Attenu	ators and equalizers	24
	6.1	Voltage dividers	24
	6.2	T and π attenuators	25
	6.3	Bridged-T attenuators	26
	6.4	Ladder attenuators	26
	6.5	Practical considerations	27
	6.6	Attenuation equalizers	28
	6.7	Phase equalizers	29
		References	31
1	Filters		32
	7.1	Passive LC filter types	32
	7.2	Impedance and frequency scaling	32
	7.3	Butterworth low-pass design	33
	7.4	Chebyshev low-pass design	34
	7.5	Cauer (elliptic) low-pass design	35
	7.6	Bessel low-pass design	36

7.7 Practical values and approximations

37



Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

CIP

vi Contents

DOCKET

Contents vii

				_			
-	7.8	Dual networks	37		o	1: -: 4:	89
-	7.9	High-pass filters	38	13		digitizers	
-	7.10	Band-pass filters	39		13.1	Pulse amplitude modulation (PAM)	89
		Band-stop filters	41		13.2	Pulse code modulation (PCM)	89
		Crystal filters	43		13.3	Differential pulse code modulation	92
	7 13	Active filters	43		13.4	Speech codecs	92
			44		13.5	Video digitizers	92
		Active low-pass design	46			References	93
		Active high-pass filters					
	7.16	Active band-pass filters	49	14	Organi	ization and standards	94
	7.17	Active band-stop filter	50	14			94
	7.18	Switched capacitor filters	51		14.1	Network operators	
		Digital filters	52		14.2	Office of Telecommunications (Oftel)	95
	7 20	Surface acoustic wave (SAW) filters	55		14.3	Interface and performance standards	95
		References	56		14.4	Open systems interconnection (OSI)	96
		Keleichees			14.5	The ITU, CCITT and CCIR	98
	-		57		14.6	CEN/CENELEC and CEPT	99
	Repeat				14.7	European Telecommunications Standards	100
		Underground repeaters	57		1.4.1	Institute (ETSI)	200
	8.2	Submerged repeaters	59		14.0		101
	8.3	Digital regenerators	59		14.8	Conformance testing and certification	
		References	60		14.9	Electromagnetic compatibility (EMC)	101
		1.010100000				Traceability and manufacturing approval	102
9 S	Signal	sources	62		14.11	Measurement standards	103
			62		14.12	Reliability and failure statistics	103
	9.1	Atomic standards	62			References	107
	9.2	Quartz standards					
	9.3	Synthesizers	62	15	Local	line terminal equipment	108
	9.4	LC and RC oscillators	63	10			108
	9.5	Off-air frequency standards	64		15.1	Constraints	
		References	64		15.2	Telephones	108
					15.3	Payphones	111
10 1	Modul	ators and demodulators	65		15.4	Cordless telephones CT1, CT2	112
			65		15.5	Answering machines	114
	10.1	Amplitude modulation	66		15.6	Telex networks	114
	10.2	Frequency modulation			15.7	Telex via the PSTN and private lines	116
1	10.3	Phase modulation	68		15.8	Alphanumeric displays – videotext	117
1	10.4	Vector modulation	68				119
1	10.5	AM detectors	69		15.9	Facsimile	
1	10.6	FM detectors	72			Computer data	123
	10.7	Phase detectors	75		15.11	Introduction of ISDN	127
	10.7	References	76			References	127
							100
11 1	Moder	ms	77	16		, LANs, WANs and VANs	129
	11.1	Overview	77		16.1	Business networks	129
		Frequency shift keying (FSK)	78		16.2	Small office systems	129
	11.2		78 78		16.3		130
	11.3	Phase modulation			16.4	Analogue private automatic branch	130
	11.4	Amplitude modulation	81		10.4		100
	11.5	Quadrature amplitude modulation	81		16 5	exchanges (PABXs)	131
	11.6	Modem connections	81		16.5		
	11.7	Integrated circuits for modems	85		16.6	Local-area networks (LANs)	135
	11.8	Modem delay time	85		16.7	Ethernet	135
		2	85		16.8	Cambridge or slotted ring	137
		References	00		16.9	Token-passing techniques	139
			06			Wideband systems	139
12 .		plexers, concentrators and front-end	86			Wide-area networks (WANs)	140
	proces						140
	12.1	Frequency division multiplexer (FDM)	86			Value-added networks (VANs)	
	12.1		86		16.13		141
1	12.1	Time division multiplexer (TDM)					
	12.2	Time division multiplexer (TDM) Concentrators	87			References	141
	12.2 12.3	Concentrators	87			References	
	12.2			17	/ Mobi	kererences les and paging networks	141 142 142

viii	Cont	ents				Conte	ents ix
	17.2	CT2	142		21.6	Intersatellite links	204
	17.3	Local private mobile radio	143		21.7	Satellites for mobile communications	204
	17.4	Trunked PMR	144		21.8	Satellites for ground-station communications	205
	17.5	Analogue cellular systems	145		21.0	References	207
	17.6	Digital cellular systems – GSM	150				
	17.7	Digital cordless systems (DECT), CT3	152	22	Switch	ng	209
	17.8	Personal communications networks	153	44	22.1	Numbering and call routing	209
	17.9	Paging	153		22.2	Electromechanical switching	211
		References	155		22.2	Crosspoint switching	212
					22.5	Digital switching	212
8	Transi	nission over the PSTN	156		22.4	Digital switching control	222
	18.1	Simplex, half duplex and duplex	156		22.5	Traffic units and Erlang's formula	223
	18.2	Bipolar and unipolar digital signals	156		22.0		225
	18.3	Multilevel signals and the Gray code	157			References	22.3
	18.4	Alternate mark inversion and high-density	157	-	a: 11		007
	10.4	bipolar	150	23	Signall		227
	10 5		150		23.1	Signalling requirements	227
	18.5	Coded mark inversion (CMI)	159		23.2	Local line signalling	227
	18.6	Cross-talk	161		23.3	Channel signalling – analogue	228
	18.7	Echo suppression and cancellation	162		23.4	Channel signalling – digital	231
	18.8	Circuit and packet switching	163		23.5	Channel associated signalling (CAS)	231
	18.9	Security	165		23.6	Common-channel signalling (CCS)	232
		Error control and correction	166		23.7	CCITT Signalling System No. 6	232
	18.11	Transparency	168		23.8	CCITT Signalling System No. 7	233
		References	169			References	236
9		blex grouping	170	24	The in	tegrated services digital network (ISDN)	237
	19.1	Frequency division multiplex - basic group	170		24.1	The conception	237
	19.2	FDM supergroup	171		24.2	The ISDN-user interface	237
	19.3	FDM hypergroup (UK)	172		24.3	The basic rate interface (BRI)	241
	19.4	FDM hypergroups (or mastergroups)	172		24.4	The primary rate interface (PRI)	241
	19.5	Time division multiplex 64 kbit/s baseband	172		24.5	Protocols	242
		signal			24.6	ISDN in the 1990s	243
	19.6	TDM – level 1 (primary) multiplex	172		24.7	CCITT and ISDN	244
		2048 kbit/s			24.7	References	245
	19.7	TDM 8 Mbit/s	175			References	245
	19.8	TDM 8-34, 34-140 and 8-120 Mbit/s	176	25	Suppo	rt requirements	246
	19.9	TDM 140-560 Mbit/s	177	25	* *		240
		FDM-TDM transition equipment	177		25.1 25.2	Transmission measuring sets (TMSs)	240
		Multiplexing time delay	178			Selective level-measuring sets (SLMSs)	248 252
		Synchronous multiplexing	179		25.3	Spectrum analysers	
	17.14	References	179		25.4	Fourier analysers	257
		References	1/9		25.5	Frequency/time-interval counters	258
20	The ir	fractive	101		25.6	Distortion analysers	260
.0		frastructure	181		25.7	Modulation analysers	261
	20.1	Channel capacity of wire cables	181		25.8	Waveform generators, signal generators and	264
	20.2	Channel capacity of fibre optic links	182			oscillators	
	20.3	Radio links	182		25.9	Digital regeneration test sets	265
	20.4	Submarine cable links	185		25.10	Digital communication test sets	266
	20.5	Asynchronous and synchronous operation	186		25.11	Protocol analysers	268
	20.6	Plesiochronous operation and slip	187			Logic analysers	270
	20.7	Trunk routing	188			Oscilloscopes and special displays	270
	20.8	Transmission standards	191			Fibre optic test equipment	273
		References	193			Fault diagnosis, repair and maintenance	275
1	S a + - 11"		194		5.15	References	279
1		Satellite communications					
	21.1			A	ppendice	s A Abbreviations and acronyms	280
	21.2	Satellite consortia	196			B Formulae relevant to	286
	21.3	Ancillary satellite equipment	197			telecommunications	
	21.4	Satellite communications equipment	198			C Summary of CCITT recommendation	300
	21.5	Satellite land stations	202			documents	

DOCKET A L A R M



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.