

A BIBLIOGRAPHY OF JIM WILLIAMS

Version 0.8

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<http://readingjimwilliams.blogspot.com>

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Abstract

Jim Williams wrote over 350 publications relating to analog circuit design between 1971 and 2011. Here's what I've found so far.¹



Photo credit: see page 20.

Contents

1 Biography	2
2 Massachusetts Institute of Technology	2
3 National Semiconductor App Notes	2
4 Linear Technology	3
4.1 App Notes	3
4.2 LT Magazine	4
4.3 Design Notes and Solutions	4
5 Books and Book Chapters	5
5.1 EDN Designer's Guides	5
5.2 Analog Circuit Design	5
5.3 Other Book Chapters	5
5.4 Analog Circuit Design 3	5
6 Magazine Articles	6
6.1 EDN	6
6.2 Electronics	6
6.3 Electronic Design	6
6.4 Other Magazines	6
7 Technical Publications	6
A How Many Oscilloscopes?	7
B Cross References	7
B.1 EDN Books	7
B.2 National Semi App Notes	7
B.3 Linear Tech App Notes	7
References	8
Revision History	20
Acknowledgments	20

¹For the latest version of this bibliography, please visit <http://web.mit.edu/klund/www/jw/>.

1 Biography

Jim Williams (1948–2011) was at the Massachusetts Institute of Technology from 1968 to 1979 concentrating exclusively on analog circuit design. His teaching and research interests involved application of analog circuit techniques to biochemical and biomedical problems. Concurrently, he consulted U.S. and foreign concerns and governments, specializing in analog circuits. In 1979, he moved to National Semiconductor Corporation, continuing his work in the analog area with the Linear Integrated Circuits Group. In 1982, he joined Linear Technology Corporation as staff scientist. His interests included product definition, development and support. Jim authored over 350 publications relating to analog circuit design. Awards include the 1992 Innovator of the Year Award from EDN Magazine and election to the Electronic Design Hall of Fame in 2002. His spare time interests included sports cars, collecting antique scientific instruments, art and restoring and using old Tektronix oscilloscopes. He lived in Palo Alto, California with his wife and 62 Tektronix oscilloscopes.²

2 Massachusetts Institute of Technology

Jim wrote several M.I.T. internal reports [1, 2, 3, 4] while he worked for the Department of Nutrition and Food Science. Another report [5] was referenced in an EDN article without a publication date.³

3 National Semiconductor App Notes

Jim worked for National Semiconductor Corporation in the Linear Integrated Circuits Group from 1979 to

²The information in this biography was given to the author by Jim Williams in 2009 (see also Appendix A).

³There were probably other reports. Unfortunately, the M.I.T. Libraries don't seem to have copies of these reports (or anything written by Jim Williams, except his 1991 and 1995 books). Searching in the M.I.T. Institute Archives and Special Collections didn't turn up anything either.

1982. During this period,⁴ he wrote 21 application notes.

- App Note 256 [6]
- App Note 260 [7]
- App Note 262 [8]
- App Note 263 [9]
- App Note 264 [10]
- App Note 265 [11]
- App Note 266 [12]
- App Note 269 [13]
- App Note 272 [14]
- App Note 285 [15]
- App Note 286 [16]
- App Note 288 [17]
- App Note 289 [18]
- App Note 292 [19]
- App Note 293 [20]
- App Note 294 [21]
- App Note 295 [22]
- App Note 298 [23]
- App Note 299 [24]
- App Note 301 [25]
- App Note 311 [26]

⁴Getting a complete list of his app notes is a bit of a mystery hunt. There are several unfortunate reasons for this difficulty:

1. National doesn't always print bylines with author's names on their app notes.
2. National regularly deletes old app notes from their archives.
3. National sometimes updates the publication date of their app notes upon revision.

Thus, for all of these application notes, I had to infer Jim's authorship based on the right time period and other clues. One reliable clue was the inclusion of photographs of Jim's Tektronix 556 oscilloscope with the damaged graticule. In other cases, I made educated guesses based on his use of references, footnotes, or subject matter. A reference to one of Jim's past publications is a good hint, a footnote discussing the Hewlett Packard HP200 oscillator is a dead giveaway! Based on this research, there are (at least?) 21 application notes. Not bad for three years' work!

For more details on the frustrations of this mystery hunt, see <http://web.mit.edu/klund/www/jw/jw-nsc.html>.

4 Linear Technology

4.1 App Notes

Jim wrote 62 application notes for Linear Technology Corporation:

- App Note 1 [27]
- App Note 2 [28]
- App Note 3 [29]
- App Note 4 [30]
- App Note 5 [31]
- App Note 6 [32]
- App Note 7 [33]
- App Note 8 [34]
- App Note 9 [35]
- App Note 10 [36]
- App Note 11 [37]
- App Note 12 [38]
- App Note 13 [39]
- App Note 14 [40]
- App Note 15 [41]
- App Note 17 [42]
- App Note 18 [43]
- App Note 21 [44]
- App Note 22 [45]
- App Note 23 [46]
- App Note 25 [47]
- App Note 28 [48]
- App Note 29 [49]
- App Note 31 [50]
- App Note 32 [51]
- App Note 35 [52]
- App Note 37 [53]
- App Note 43 [54]
- App Note 45 [55]
- App Note 47 [56]
- App Note 49 [57]
- App Note 55 [58]
- App Note 61 [59]
- App Note 65 [60]
- App Note 70 [61]
- App Note 72 [62]
- App Note 74 [63]

- App Note 75 [64]
- App Note 79 [65]
- App Note 81 [66]
- App Note 83 [67]
- App Note 85 [68]
- App Note 86 [69]
- App Note 89 [70]
- App Note 90 [71]
- App Note 92 [72]
- App Note 93 [73]
- App Note 94 [74]
- App Note 95 [75]
- App Note 98 [76]
- App Note 101 [77]
- App Note 104 [78]
- App Note 106 [79]
- App Note 112 [80]
- App Note 113 [81]
- App Note 118 [82]
- App Note 120 [83]
- App Note 122 [84]
- App Note 124 [85]
- App Note 126 [86]
- App Note 128 [87]
- App Note 131 [88]

In October 2011, Linear Technology released a sixty-third app note, App Note 132 [89]. Although this note bears his name (as coauthor) and discusses an appropriate topic, (a high-purity sine wave oscillator⁵), Jim’s signature touches are absent⁶.

⁵As Jim said in [52], “The sinewave is probably the paramount expression of the analog world. The Old Man Himself, George A. Philbrick, once elegantly discussed analog functions as ‘those which are continuous in excursion and time’.”

⁶The oscilloscope shots are not from his Tektronix 556, there’s no hand-drawn cartoon, there are no voluminous appendices, and there are three pages on computer-screen captures. It just doesn’t feel like Jim.

4.2 LT Magazine

Jim wrote several short articles for Linear Technology Magazine between 1991 and 2009:⁷

Volume 1 [90, 91, 92, 93]
Volume 2 [94]
Volume 3 [95, 96, 97]
Volume 4 [98, 99]
Volume 6 [100, 101]
Volume 7 [102]
Volume 8 [103, 104, 105, 106]
Volume 9 [107, 108]
Volume 12 [109]
Volume 15 [110]
Volume 16 [111, 112]
Volume 17 [113]
Volume 19 [114, 115]

4.3 Design Notes and Solutions

Jim also wrote some short (two-page) Design Notes:⁸

- Design Note 8 [116]
- Design Note 11 [117]
- Design Note 17 [118]
- Design Note 32 [119]
- Design Note 38 [120]
- Design Note 40 [121]
- Design Note 44 [122]
- Design Note 45 [123]
- Design Note 51 [124]
- Design Note 52 [125]
- Design Note 58 [126]
- Design Note 70 [127]
- Design Note 101 [128]
- Design Note 137 [129]
- Design Note 163 [130]
- Design Note 164 [131]
- Design Note 185 [132]
- Design Note 190 [133]
- Design Note 220 [134]
- Design Note 345 [135]

He also wrote Design Solution 11 [136]⁹.

⁷See http://www.linear.com/designtools/lt_journal.php. This list is based on the issues found on the Linear Technology website. There may be some missing issues (there are gaps in the number sequence). For example, volume 11 only has one issue. Other obviously missing issues include vol. 10 no. 3, vol. 12 no. 1, vol. 13 no. 1, and vol. 14 no. 1.

⁸List <http://www.linear.com/doclist/?au=Jim+Williams> is incomplete. It lists all the app notes, but some of the design notes are missing, and there may be other missing items. I have a complete collection up to Design Note 69, but after that, my coverage is incomplete.

⁹Were there other Design Solutions?

5 Books and Book Chapters

Jim edited five books [137, 138, 139, 140, 141].

5.1 EDN Designer's Guides

Jim edited two books of collected articles from EDN in 1985 and 1987. The first one [137] included 25 collected articles from his time at M.I.T., Teledyne Philbrick, Arthur D. Little, and National Semiconductor. The second book [138] included 26 collected articles from the early days at Linear Technology. For a list of articles in these books, see Section B.1.

5.2 Analog Circuit Design

In the 1990s, he edited of two books on analog circuit design [139, 140] with a wide variety of authors submitting chapters. In these books, he authored several chapters himself:

- “Is analog circuit design dead?” [142]
- “Max Wien, Mr. Hewlett, and a rainy Sunday afternoon” [143]
- “Should Ohm’s Law be repealed?” [144]
- “The zoo circuit: History, mistakes, and some monkeys design a circuit” [145]
- “The importance of fixing” [146]
- “Tripping the light fantastic” [147]
- “There’s no place like home” [148]

5.3 Other Book Chapters

He also contributed a chapter [149] to Bob Pease’s book, “Analog Circuits: World Class Designs”, which is a reprint of the “The zoo circuit” [145].

5.4 Analog Circuit Design 3

In 2011, he co-edited a third book in this “series” with Bob Dobkin [141]. This final book is a collection of 41 reprinted Linear Technology Application Notes, of which Jim wrote 27:

- Chapter 2 is App Note 101 [77]
- Chapter 4 is App Note 126 [86]
- Chapter 6 is App Note 25 [47]
- Chapter 7 is App Note 35 [52]
- Chapter 8 is App Note 70 [61]
- Chapter 11 is App Note 122 [84]
- Chapter 12 is App Note 83 [67]
- Chapter 15 is App Note 81 [66]
- Chapter 16 is App Note 89 [70]
- Chapter 17 is App Note 90 [71]
- Chapter 18 is App Note 92 [72]
- Chapter 19 is App Note 112 [80]
- Chapter 20 is App Note 7 [33]
- Chapter 22 is App Note 86 [69]
- Chapter 24 is App Note 120 [83]
- Chapter 25 is App Note 3 [29]
- Chapter 26 is App Note 9 [35]
- Chapter 27 is App Note 11 [37]
- Chapter 29 is App Note 23 [46]
- Chapter 30 is App Note 28 [48]
- Chapter 32 is App Note 43 [54]
- Chapter 33 is App Note 47 [56]
- Chapter 34 is App Note 72 [62]
- Chapter 36 is App Note 93 [73]
- Chapter 37 is App Note 94 [74]
- Chapter 38 is App Note 106 [79]
- Chapter 39 is App Note 124 [85]

Unfortunately, unlike his other *Analog Circuit Design* books [139, 140], there is no original material in this book.

6 Magazine Articles

Jim wrote many, many articles in various trade magazines.

6.1 EDN

Papers published between 1975 and 2011. He wrote 35 full-length feature articles that appeared in EDN between June 1983 and November 1987 (according to [150]¹⁰). EDN recently listed¹¹ some of the articles that he wrote between 1994 and 2011.

1975 [151]
1976 [152]
1977 [153] [154] [155] [156]
1978 [157]
1979 [158]
1980 [159] [160]
1981 [161] [162] [163] [164] [165] [166] [167] [168]
1982 [169] [170] [171] [172] [173] [174]
1983 [175] [176] [177] [178] [179] [180]
1984 [181] [182] [183] [184] [185] [186]
1985 [187] [188] [189] [190] [191] [192] [193] [194] [195] [196]
1986 [197] [198] [199] [200]
1987 [201] [202] [203] [204] [205] [206]
1988 [207] [208] [209] [210] [211] [212]
1989 [213] [214]
1990 [215] [216] [217] [218]
1991 [219] [220] [221] [222] [223] [224] [225] [226]
1992 [227]
1993
1994 [228] [229] [230]
1995 [231] [232] [233]
1996 [234] [235] [236]
1997 [237] [238]
1998 [239] [240] [241]
1999 [242] [243]
2000 [244] [245] [246] [247]
2001 [248] [249] [250] [251] [252]
2002 [253]
2003 [254] [255] [256] [257] [258]
2004 [259] [260]
2005 [261] [262] [263] [150] [264]
2006 [265] [266]
2007 [267] [268]
2008 [269] [270]
2009 [271] [272] [273]
2010 [274] [275] [276]
2011 [277]

¹⁰Right now, I have 29 of them. He published two papers in May 1983; am I not supposed to count them?

¹¹http://www.edn.com/article/472111-Jim_Williams.php

6.2 Electronics

Papers published between 1974 and 1981.

1974 [278]
1975 [279] [280]
1980 [281]
1981 [282] [283] [284] [285] [286]

6.3 Electronic Design

Papers published between 1974 and 1985.

1974 [287] [288] [289]
1975 [290]
1977 [291]
1981 [292] [293] [294] [295] [296] [297]
1983 [298]
1984 [299] [300] [301]
1985 [302]

6.4 Other Magazines

Jim wrote a short article for Analog Dialogue in 1976 [303]. He wrote one article in Electronic Engineering in 1983 with George Erdi [304]. He wrote an article in New Electronics [305], an article in ESD [306], an article in VLSI Systems Design [307], an article in EE Times [308], and an article in Electronic Design Analog Applications [309].

Also, there were three articles in Electronic Product Design:

1983 [310]
1984 [311]
1986 [312]

7 Technical Publications

Jim coauthored two papers in Analytical Biochemistry [313, 314] while he was at MIT. Jim co-wrote one ISSCC paper in 1986 [315] on the LT1088 RMS-to-DC converter. He also wrote a 1986 Wescon paper [316].

A How Many Oscilloscopes?

In the biography that Jim wrote in 2009 (see Section 1), he said he owned 62 Tektronix oscilloscopes. It is interesting to see how this number changed over time. In 1991 [139], he claimed 14 oscilloscopes. In 1995 [140], he claimed 28 oscilloscopes. In 2008 (in the bio with [149]), he claimed 84 oscilloscopes.

B Cross References

B.1 EDN Books

Jim edited two books of his collected articles from EDN.¹² The first book [137] included the following articles (in the order they appear in the book) [158] [175] [170] [173] [163] [172] [155] [166] [171] [168] [165] [317] [153] [318] [167] [319] [174] [151] [164] [157] [160] [161] [159] [154] [162].¹³

The second book [138] included the following articles (in the order they appear in the book) [178] [181] [183] [188] [189] [190] [196] [193] [194] [195] [158] [197] [176] [177] [182] [184] [186] [187] [191] [192] [198] [199] [200] [179] [180] [185].

B.2 National Semi App Notes

He cited some of his magazine articles in two of his app notes for National Semiconductor. These articles that were cited:

App Note 256 referenced [159].

App Note 260 referenced [290, 280, 157, 4].

B.3 Linear Tech App Notes

He cited some of his magazine articles in his app notes for Linear Technology. These articles that were cited (this list does not include cross references to other app notes) :

App Note 9 referenced [290]

App Note 13 referenced [160, 296]

App Note 14 referenced [157]

App Note 22 referenced [315]

App Note 28 referenced [153]

App Note 29 referenced [295, 174]

App Note 49 referenced [315]

App Note 55 referenced [1, 154, 315]¹⁴

App Note 61 referenced [315]

App Note 55 referenced [1, 315]

App Note 70 referenced [295, 174, 209]

App Note 72 referenced [296]

App Note 74 referenced [185]

App Note 75 referenced [157, 185]

App Note 79 referenced [241]

App Note 81 referenced [165, 211]

App Note 83 referenced [315]

App Note 86 referenced [290]

App Note 89 referenced [1, 155]

App Note 92 referenced [183]

App Note 112 referenced [169]

App Note 120 referenced [241, 185]

App Note 128 referenced [241, 185]

¹²Unfortunately, these books do not include any information about when the articles were originally published. Shameful. All dates listed in the bibliography entries have been found from secondary sources.

¹³I need more information about [317, 318, 319]. I can't find the original publication data.

¹⁴Reference 20 in this app note is "The Ultimate Oven," MIT Reports on Research, March 1972. This article is about Jim's work, but he didn't write it.

References

- [1] Jim Williams, "Temperature controlling to microdegrees," Massachusetts Institute of Technology, Cambridge, Mass., Education Research Center, Oct. 1971.
- [2] Jim Williams, "Portable wide range chopper stabilized temperature controller," Massachusetts Institute of Technology, Cambridge, Mass., Dept. of Nutrition and Food Science, 1974.
- [3] Jim Williams, "An experimental microprocessor-controlled 18-bit single-slope A/D converter with 1-ppm linearity," Massachusetts Institute of Technology, Cambridge, Mass., Dept. of Nutrition and Food Science, 1975.
- [4] Jim Williams, "Characterization, measurement, and compensation of errors in capacitors... a compendium of study, hacks, some good stuff, and a few pearls," Massachusetts Institute of Technology, Cambridge, Mass., Dept. of Nutrition and Food Science, 1975.
- [5] Jim Williams, "A 0.1-Hz sine wave oscillator using thermal feedback," Massachusetts Institute of Technology, Cambridge, Mass., Dept. of Nutrition and Food Science, unknown date.
- [6] Jim Williams, "Circuitry for inexpensive relative humidity measurement," National Semiconductor Corp., Santa Clara, Calif., Application Note 256, Aug. 1981.
- [7] Jim Williams, "A 20-bit (1 ppm) linear slope-integrating A/D converter," National Semiconductor Corp., Santa Clara, Calif., Application Note 260, Jan. 1981.
- [8] Jim Williams, "Applying dual and quad FET op amps," National Semiconductor Corp., Santa Clara, Calif., Application Note 262, May 1981.
- [9] Jim Williams, "Sine wave generation techniques," National Semiconductor Corp., Santa Clara, Calif., Application Note 263, Mar. 1981.
- [10] Jim Williams, "Applications of audio amplifier-transistor array ICs," National Semiconductor Corp., Santa Clara, Calif., Application Note 264, May 1981.
- [11] Jim Williams, "An electronic watt-watt-hour meter," National Semiconductor Corp., Santa Clara, Calif., Application Note 265, Feb. 1984.
- [12] Jim Williams, "Circuit applications of sample-hold amplifiers," National Semiconductor Corp., Santa Clara, Calif., Application Note 266, Jan. 1981.
- [13] Jim Williams, "Circuit applications of multiplying CMOS D to A converters," National Semiconductor Corp., Santa Clara, Calif., Application Note 269, Sep. 1981.
- [14] Jim Williams, "Op amp booster designs," National Semiconductor Corp., Santa Clara, Calif., Application Note 272, Sep. 1981.
- [15] Jim Williams, "An acoustic transformer powered super-high isolation amplifier," National Semiconductor Corp., Santa Clara, Calif., Application Note 285, Oct. 1981.
- [16] Jim Williams, "Applications of the LM392 comparator op amp IC," National Semiconductor Corp., Santa Clara, Calif., Application Note 286, Sep. 1981.
- [17] Jim Williams, "System-oriented DC-DC conversion techniques," National Semiconductor Corp., Santa Clara, Calif., Application Note 288, Apr. 1982.
- [18] Jim Williams, "Circuit applications of analog data multiplexers," National Semiconductor Corp., Santa Clara, Calif., Application Note 289, Jan. 1982.
- [19] Jim Williams, "Applications of the LM3524 pulse-width-modulator," National Semiconductor Corp., Santa Clara, Calif., Application Note 292, Aug. 1982.
- [20] Jim Williams, "Control applications of CMOS DACs," National Semiconductor Corp., Santa Clara, Calif., Application Note 293, Mar. 1982.
- [21] Jim Williams, "Special sample and hold techniques," National Semiconductor Corp., Santa Clara, Calif., Application Note 294, Apr. 1982.
- [22] Jim Williams, "A high performance industrial weighing system," National Semiconductor Corp., Santa Clara, Calif., Application Note 295, Mar. 1982.
- [23] Jim Williams, "Isolation techniques for signal conditioning," National Semiconductor Corp., Santa Clara, Calif., Application Note 298, May 1982.
- [24] Jim Williams, "Audio applications of linear integrated circuits," National Semiconductor Corp., Santa Clara, Calif., Application Note 299, Apr. 1982.

- [25] Jim Williams, "Signal conditioning for sophisticated transducers," National Semiconductor Corp., Santa Clara, Calif., Application Note 301, Jan. 1982.
- [26] Jim Williams, "Theory and applications of logarithmic amplifiers," National Semiconductor Corp., Santa Clara, Calif., Application Note 311, Jul. 1982.
- [27] Jim Williams, "Understanding and applying the LT1005 multifunction regulator," Linear Technology Corp., Milpitas, Calif., Application Note 1, Aug. 1985.
- [28] Jim Williams, "Performance enhancement techniques for three-terminal regulators," Linear Technology Corp., Milpitas, Calif., Application Note 2, Aug. 1984.
- [29] Jim Williams, "Applications for a switched-capacitor instrumentation building block," Linear Technology Corp., Milpitas, Calif., Application Note 3, Jul. 1985.
- [30] Jim Williams, "Applications for a new power buffer," Linear Technology Corp., Milpitas, Calif., Application Note 4, Sep. 1984.
- [31] Jim Williams, "Thermal techniques in measurement and control circuitry," Linear Technology Corp., Milpitas, Calif., Application Note 5, Dec. 1984.
- [32] Jim Williams, "Applications of new precision op amps," Linear Technology Corp., Milpitas, Calif., Application Note 6, Jan. 1985.
- [33] Jim Williams, "Some techniques for direct digitization of transducer outputs," Linear Technology Corp., Milpitas, Calif., Application Note 7, Feb. 1985.
- [34] Jim Williams, "Power conditioning techniques for batteries," Linear Technology Corp., Milpitas, Calif., Application Note 8, May 1985.
- [35] Jim Williams, "Application considerations and circuits for a new chopper-stabilized op amp," Linear Technology Corp., Milpitas, Calif., Application Note 9, Aug. 1986.
- [36] Jim Williams, "Methods for measuring op amp settling time," Linear Technology Corp., Milpitas, Calif., Application Note 10, Jul. 1985.
- [37] Jim Williams, "Designing linear circuits for 5V single supply operation," Linear Technology Corp., Milpitas, Calif., Application Note 11, Sep. 1985.
- [38] Jim Williams, "Circuit techniques for clock sources," Linear Technology Corp., Milpitas, Calif., Application Note 12, Oct. 1985.
- [39] Jim Williams, "High speed comparator techniques," Linear Technology Corp., Milpitas, Calif., Application Note 13, Apr. 1985.
- [40] Jim Williams, "Designs for high performance voltage-to-frequency converters," Linear Technology Corp., Milpitas, Calif., Application Note 14, Mar. 1986.
- [41] Jim Williams, "Circuitry for single cell operation," Linear Technology Corp., Milpitas, Calif., Application Note 15, Nov. 1985.
- [42] Jim Williams, "Considerations for successive approximation A \rightarrow D converters," Linear Technology Corp., Milpitas, Calif., Application Note 17, Dec. 1985.
- [43] Jim Williams, "Power gain stages for monolithic amplifiers," Linear Technology Corp., Milpitas, Calif., Application Note 18, Mar. 1986.
- [44] Jim Williams, "Composite amplifiers," Linear Technology Corp., Milpitas, Calif., Application Note 21, Jul. 1986.
- [45] Jim Williams, "A monolithic IC for 100MHz RMS-DC conversion," Linear Technology Corp., Milpitas, Calif., Application Note 22, Sep. 1987.
- [46] Jim Williams, "Micropower circuits for signal conditioning," Linear Technology Corp., Milpitas, Calif., Application Note 23, Apr. 1987.
- [47] Jim Williams, "Switching regulators for poets: A gentle guide for the trepidatious," Linear Technology Corp., Milpitas, Calif., Application Note 25, Sep. 1987.
- [48] Jim Williams, "Thermocouple measurement," Linear Technology Corp., Milpitas, Calif., Application Note 28, Feb. 1988.
- [49] Jim Williams and Brian Huffman, "Some thoughts on DC-DC converters," Linear Technology Corp., Milpitas, Calif., Application Note 29, Oct. 1988.
- [50] Jim Williams, "Linear circuits for digital systems: Some affable analogs for digital devotees," Linear Technology Corp., Milpitas, Calif., Application Note 31, Feb. 1989.
- [51] Jim Williams, "High efficiency linear regulators," Linear Technology Corp., Milpitas, Calif., Application Note 32, Mar. 1989.

- [52] Jim Williams, "Step down switching regulators," Linear Technology Corp., Milpitas, Calif., Application Note 35, Aug. 1989.
- [53] Jim Williams, "Fast charge circuits for NiCad batteries," Linear Technology Corp., Milpitas, Calif., Application Note 37, Feb. 1990.
- [54] Jim Williams, "Bridge circuits: Marrying gain and balance," Linear Technology Corp., Milpitas, Calif., Application Note 43, Jun. 1990.
- [55] Jim Williams, "Measurement and control circuit collection: Diapers and designs on the night shift," Linear Technology Corp., Milpitas, Calif., Application Note 45, Jun. 1991.
- [56] Jim Williams, "High speed amplifier techniques: A designer's companion for wideband circuitry," Linear Technology Corp., Milpitas, Calif., Application Note 47, Aug. 1991.
- [57] Jim Williams, "Illumination circuitry for liquid crystal displays: Tripping the light fantastic..." Linear Technology Corp., Milpitas, Calif., Application Note 49, Aug. 1992.
- [58] Jim Williams, "Techniques for 92% efficient LCD illumination: Waste not, want not..." Linear Technology Corp., Milpitas, Calif., Application Note 55, Aug. 1993.
- [59] Jim Williams, "Practical circuitry for measurement and control problems: Circuits designed for a cruel and unyielding world," Linear Technology Corp., Milpitas, Calif., Application Note 61, Aug. 1994.
- [60] Jim Williams, "A fourth generation of LCD backlight technology: Component and measurement improvements refine performance," Linear Technology Corp., Milpitas, Calif., Application Note 65, Nov. 1995.
- [61] Jim Williams, "A monolithic switching regulator with $100\mu\text{V}$ output noise: Silence is the perfectest herald of joy..." Linear Technology Corp., Milpitas, Calif., Application Note 70, Oct. 1997.
- [62] Jim Williams, "A seven-nanosecond comparator for single supply operation: Guidance for putting civilized speed to work," Linear Technology Corp., Milpitas, Calif., Application Note 72, May 1998.
- [63] Jim Williams, "Component and measurement advances ensure 16-bit DAC settling time: The art of timely accuracy," Linear Technology Corp., Milpitas, Calif., Application Note 74, Jul. 1998.
- [64] Jim Williams, "Circuitry for signal conditioning and power conversion: Designs from a once lazy sabbatical," Linear Technology Corp., Milpitas, Calif., Application Note 75, Mar. 1999.
- [65] Jim Williams, "30 nanosecond settling time measurement for a precision wideband amplifier: Quantifying prompt certainty," Linear Technology Corp., Milpitas, Calif., Application Note 79, Sep. 1999.
- [66] Jim Williams, Jim Phillips, and Gary Vaughn, "Ultracompact LCD backlight inverters: A svelte beast cuts high voltage down to size," Linear Technology Corp., Milpitas, Calif., Application Note 81, Sep. 1999.
- [67] Jim Williams and Todd Owen, "Performance verification of low noise, low dropout regulators: Silence of the amps," Linear Technology Corp., Milpitas, Calif., Application Note 83, Mar. 2000.
- [68] Jim Williams and David Beebe, "Low noise varactor biasing with switching regulators: Vanquishing villainous vitiators vis-à-vis vital varactors," Linear Technology Corp., Milpitas, Calif., Application Note 85, Aug. 2000.
- [69] Jim Williams, J. Brubaker, P. Copley, J. Guerrero, and F. Oprescu, "A standards lab grade 20-bit DAC with $0.1\text{ppm}/^\circ\text{C}$ drift: The dedicated art of digitizing one part per million," Linear Technology Corp., Milpitas, Calif., Application Note 86, Jan. 2001.
- [70] Jim Williams, "A thermoelectric cooler temperature controller for fiber optic lasers: Climatic pampering for temperamental lasers," Linear Technology Corp., Milpitas, Calif., Application Note 89, Apr. 2001.
- [71] Jim Williams, "Current sources for fiber optic lasers: A compendium of pleasant current events," Linear Technology Corp., Milpitas, Calif., Application Note 90, Apr. 2002.
- [72] Jim Williams, "Bias voltage and current sense circuits for avalanche photodiodes: Feeding and reading the APD," Linear Technology Corp., Milpitas, Calif., Application Note 92, Nov. 2002.
- [73] Jim Williams, "Instrumentation applications for a monolithic oscillator: A clock for all reasons," Linear Technology Corp., Milpitas, Calif., Application Note 93, Feb. 2003.
- [74] Jim Williams, "Slew rate verification for wideband amplifiers: The taming of the slew," Linear Technology Corp., Milpitas, Calif., Application Note 94, May 2003.

- [75] Jim Williams and Albert Wu, "Simple circuitry for cellular telephone/camera flash illumination: A practical guide for successfully implementing flash-lamps," Linear Technology Corp., Milpitas, Calif., Application Note 95, Mar. 2004.
- [76] Jim Williams, "Signal sources, conditioners and power circuitry: Circuits of the Fall, 2004," Linear Technology Corp., Milpitas, Calif., Application Note 98, Nov. 2004.
- [77] Jim Williams, "Minimizing switching regulator residue in linear regulator outputs: Banishing those accursed spikes," Linear Technology Corp., Milpitas, Calif., Application Note 101, Jul. 2005.
- [78] Jim Williams, "Load transient response testing for voltage regulators: Practical considerations for testing and evaluating results," Linear Technology Corp., Milpitas, Calif., Application Note 104, Oct. 2006.
- [79] Jim Williams, "Instrumentation circuitry using RMS-to-DC converters: RMS converters rectify average results," Linear Technology Corp., Milpitas, Calif., Application Note 106, Feb. 2007.
- [80] Jim Williams and Mark Thoren, "Developments in battery stack voltage measurement: A simple solution to a not so simple problem," Linear Technology Corp., Milpitas, Calif., Application Note 112, Mar. 2007.
- [81] Jim Williams, "Power conversion, measurement and pulse circuits: Tales from the laboratory notebook, 2005–2007," Linear Technology Corp., Milpitas, Calif., Application Note 113, Aug. 2007.
- [82] Jim Williams, "High voltage, low noise, DC/DC converters: A kilovolt with 100 microvolts of noise," Linear Technology Corp., Milpitas, Calif., Application Note 118, Mar. 2008.
- [83] Jim Williams, "1ppm settling time measurement for a monolithic 18-bit DAC: When does the last angel stop dancing on a speeding pinhead?" Linear Technology Corp., Milpitas, Calif., Application Note 120, Mar. 2010.
- [84] Jim Williams and David Beebe, "Diode turn-on time induced failures in switching regulators: Never has so much trouble been had by so many with so few terminals," Linear Technology Corp., Milpitas, Calif., Application Note 122, Jan. 2009.
- [85] Jim Williams, "775 nanovolt noise measurement for a low noise voltage reference: Quantifying silence," Linear Technology Corp., Milpitas, Calif., Application Note 124, Jul. 2009.
- [86] Jim Williams, Jesus Rosales, Kurk Mathews, and Tom Hack, "2-wire virtual remote sensing for voltage regulators: Clairvoyance marries remote sensing," Linear Technology Corp., Milpitas, Calif., Application Note 126, Oct. 2010.
- [87] Jim Williams, "2 nanosecond, .1% resolution settling time measurement for wideband amplifiers: Quantifying quick quiescence," Linear Technology Corp., Milpitas, Calif., Application Note 128, Jun. 2010.
- [88] Jim Williams and Omar Sanchez-Felipe, "An introduction to acoustic thermometry: An air filled olive jar teaches signal conditioning," Linear Technology Corp., Milpitas, Calif., Application Note 131, Feb. 2011.
- [89] Jim Williams and Guy Hoover, "Fidelity testing for A→D converters: Proving purity," Linear Technology Corp., Milpitas, Calif., Application Note 132, Feb. 2011, (released Oct. 2011).
- [90] Jim Williams, "LT1074 family of step down switching ICs," *Linear Technology Magazine*, vol. 1, no. 1, pp. 7–9, Jun. 1991.
- [91] Jim Williams and Dennis O'Neill, "An LT1123 ultra low dropout 5V regulator," *Linear Technology Magazine*, vol. 1, no. 1, p. 14, Jun. 1991.
- [92] Jim Williams, "RF leveling loop," *Linear Technology Magazine*, vol. 1, no. 2, p. 16, Oct. 1991.
- [93] Jim Williams, "Ultra-low noise and low drift chopped-FET amplifier," *Linear Technology Magazine*, vol. 1, no. 2, p. 17, Oct. 1991.
- [94] Jim Williams, "Illumination circuitry for liquid crystal displays," *Linear Technology Magazine*, vol. 2, no. 1, pp. 3–7, Jun. 1992.
- [95] Jim Williams, "A simple, efficient laser power supply," *Linear Technology Magazine*, vol. 3, no. 1, p. 13, Feb. 1993.
- [96] Jim Williams, "200mA output 1.5V-to-5V converter," *Linear Technology Magazine*, vol. 3, no. 1, p. 17, Feb. 1993.
- [97] Jim Williams, "A broadband random noise generator," *Linear Technology Magazine*, vol. 3, no. 2, p. 20, Jun. 1993.
- [98] Jim Williams and Steve Pietkiewicz, "A single-cell barometer," *Linear Technology Magazine*, vol. 4, no. 1, p. 22, Feb. 1994.

- [99] Jim Williams, Sean Gold, and Steve Pietkiewicz, "Clock-synchronized switching regulator had coherent noise," *Linear Technology Magazine*, vol. 4, no. 1, pp. 24–25, Feb. 1994.
- [100] Jim Williams, "Selection criteria for CCFL circuits," *Linear Technology Magazine*, vol. 6, no. 2, pp. 24–28, May 1996.
- [101] Jim Williams, "LTC1441-based micropower voltage-to-frequency converter," *Linear Technology Magazine*, vol. 6, no. 3, pp. 38–39, Aug. 1996.
- [102] Jim Williams, "0.05 $\mu\text{V}/^\circ\text{C}$ chopper amplifier requires only 5 μA supply current," *Linear Technology Magazine*, vol. 7, no. 2, p. 28, Jun. 1997.
- [103] Jim Williams, "LT1533 ultralow noise switching regulator for high voltage or high current applications," *Linear Technology Magazine*, vol. 8, no. 1, pp. 24–25, Feb. 1998.
- [104] Jim Williams and Brian Hamilton, "A 7ns, 6mA, single-supply comparator fabricated on linear's 6GHz complementary bipolar process," *Linear Technology Magazine*, vol. 8, no. 2, pp. 20–24, May 1998.
- [105] Jim Williams, "Component and measurement advances ensure 16-bit DAC settling time (part one)," *Linear Technology Magazine*, vol. 8, no. 3, pp. 30–33, Aug. 1998.
- [106] Jim Williams, "Component and measurement advances ensure 16-bit DAC settling time (part two)," *Linear Technology Magazine*, vol. 8, no. 4, pp. 31–34, Nov. 1998.
- [107] Jim Williams, "SMBus controlled CCFL power supply," *Linear Technology Magazine*, vol. 9, no. 3, p. 35, Sep. 1999.
- [108] Jim Williams, "Cost and space efficient backlighting for small LCD panels," *Linear Technology Magazine*, vol. 9, no. 4, p. 27, Nov. 1999.
- [109] Jim Williams, "Bootstrapped power supply permits single rail amplifier output swing to ground (and below)," *Linear Technology Magazine*, vol. 12, no. 4, p. 36, Dec. 2002.
- [110] Jim Williams, "Determine the real internal resistance of a battery," *Linear Technology Magazine*, vol. 15, no. 3, p. 38, Sep. 2005.
- [111] Jim Williams, "40nV_{P-P} noise 0.05 $\mu\text{V}/^\circ\text{C}$ drift chopped FET amplifier," *Linear Technology Magazine*, vol. 16, no. 1, p. 39, Mar. 2006.
- [112] Jim Williams, "J-FET-based DC/DC converter starts and runs from 300mV supply," *Linear Technology Magazine*, vol. 16, no. 3, pp. 34–35, Sep. 2006.
- [113] Jim Williams, "Sub- μA RMS current measurement for quartz crystals," *Linear Technology Magazine*, vol. 17, no. 2, pp. 41–42, Jun. 2007.
- [114] Jim Williams and David Beebe, "Diode turn-on time induced failures in switching regulators," *Linear Technology Magazine*, vol. 19, no. 1, pp. 34–38, Mar. 2009.
- [115] Jim Williams, "775 nanovolt noise measurement for a low noise voltage regulator: Quantifying silence," *Linear Technology Magazine*, vol. 19, no. 4, pp. 6–9, Dec. 2009.
- [116] Jim Williams, "Inductor selection for LT1070 switching regulators," Linear Technology Corp., Milpitas, Calif., Design Note 8, Mar. 1988.
- [117] Jim Williams, "Achieving microamp quiescent current in switching regulators," Linear Technology Corp., Milpitas, Calif., Design Note 11, Jun. 1988.
- [118] Jim Williams, "Programming pulse generators for flash memories," Linear Technology Corp., Milpitas, Calif., Design Note 17, Nov. 1988.
- [119] Jim Williams, "A simple ultra-low dropout regulator," Linear Technology Corp., Milpitas, Calif., Design Note 32, Mar. 1990.
- [120] Guy Hoover, William Rempfer, and Jim Williams, "Applications for a new micropower, low charge injection analog switch," Linear Technology Corp., Milpitas, Calif., Design Note 38, Aug. 1990.
- [121] Jim Williams, "Designing with a new family of instrumentation amplifiers," Linear Technology Corp., Milpitas, Calif., Design Note 40, Oct. 1990.
- [122] Jim Williams, "A simple ultra-low dropout regulator," Linear Technology Corp., Milpitas, Calif., Design Note 44, Feb. 1991.
- [123] Jim Williams, "Signal conditioning for platinum temperature transducers," Linear Technology Corp., Milpitas, Calif., Design Note 45, Mar. 1991.
- [124] Jim Williams, "Gain trimming in instrumentation amplifier based systems," Linear Technology Corp., Milpitas, Calif., Design Note 51, Jun. 1991.
- [125] Steve Pietkiewicz and Jim Williams, "DC-DC converters for portable computers," Linear Technology Corp., Milpitas, Calif., Design Note 52, Jul. 1991.

- [126] Steve Pietkiewicz and Jim Williams, "A simple surface mount flash memory Vpp generator," Linear Technology Corp., Milpitas, Calif., Design Note 58, 1991.
- [127] Jim Williams, "A broadband random noise generator," Linear Technology Corp., Milpitas, Calif., Design Note 70, May 1993.
- [128] Jim Williams, "A precision wideband current probe for LCD backlight," Linear Technology Corp., Milpitas, Calif., Design Note 101, Apr. 1995.
- [129] Jim Williams, "New comparators feature micropower operation under all conditions," Linear Technology Corp., Milpitas, Calif., Design Note 137, Sep. 1996.
- [130] Jim Williams, "1 μ A op amp permits precision portable circuitry," Linear Technology Corp., Milpitas, Calif., Design Note 163, Sep. 1997.
- [131] Jim Williams, "High power CCFL backlight inverter for desktop LCD displays," Linear Technology Corp., Milpitas, Calif., Design Note 164, Sep. 1997.
- [132] Jim Williams, "A seven nanosecond comparator for single-supply operation," Linear Technology Corp., Milpitas, Calif., Design Note 185, Aug. 1998.
- [133] Jim Williams, "Op amp, comparator and reference IC provides micropower monitoring capability," Linear Technology Corp., Milpitas, Calif., Design Note 190, Sep. 1998.
- [134] Todd Owen and Jim Williams, "Lowest noise SOT-23 LDOs have 20 μ A quiescent current 20 μ V_{RMS} noise," Linear Technology Corp., Milpitas, Calif., Design Note 220, Sep. 1998.
- [135] Jim Williams, "Basic flashlamp illumination circuitry for cellular telephones/cameras," Linear Technology Corp., Milpitas, Calif., Design Note 345, Sep. 2004.
- [136] Jim Williams, "Testing linearity of the LTC2400 24-bit no latency $\Delta\Sigma$ A/D converter: help from the nineteenth century," Linear Technology Corp., Milpitas, Calif., Design Solutions 11, Nov. 1999.
- [137] Jim Williams, Ed., *A Designer's Guide to Innovative Linear Circuits*. Newton, Mass.: Cahners Publishing, 1985, vol. 1.
- [138] Jim Williams, Ed., *A Designer's Guide to Innovative Linear Circuits*. Newton, Mass.: Cahners Publishing, 1987, vol. 2.
- [139] Jim Williams, Ed., *Analog Circuit Design: Art, Science, and Personalities*. Boston: Butterworth-Heinemann, 1991.
- [140] Jim Williams, Ed., *The Art and Science of Analog Circuit Design*. Boston: Butterworth-Heinemann, 1995.
- [141] Bob Dobkin and Jim Williams, Eds., *Analog Circuit Design: A Tutorial Guide to Applications and Solutions*. Boston: Newnes, 2011.
- [142] Jim Williams, "Is analog circuit design dead?" in *Analog Circuit Design: Art, Science, and Personalities*, Jim Williams, Ed. Boston: Butterworth-Heinemann, 1991, ch. 4, pp. 17–20.
- [143] Jim Williams, "Max Wien, Mr. Hewlett, and a rainy Sunday afternoon," in *Analog Circuit Design: Art, Science, and Personalities*, Jim Williams, Ed. Boston: Butterworth-Heinemann, 1991, ch. 7, pp. 43–55.
- [144] Jim Williams, "Should Ohm's Law be repealed?" in *Analog Circuit Design: Art, Science, and Personalities*, Jim Williams, Ed. Boston: Butterworth-Heinemann, 1991, ch. 13, pp. 99–104.
- [145] Jim Williams, "The zoo circuit: History, mistakes, and some monkeys design a circuit," in *Analog Circuit Design: Art, Science, and Personalities*, Jim Williams, Ed. Boston: Butterworth-Heinemann, 1991, ch. 23, pp. 215–230.
- [146] Jim Williams, "The importance of fixing," in *The Art and Science of Analog Circuit Design*, Jim Williams, Ed. Boston: Butterworth-Heinemann, 1995, ch. 1, pp. 3–7.
- [147] Jim Williams, "Tripping the light fantastic," in *The Art and Science of Analog Circuit Design*, Jim Williams, Ed. Boston: Butterworth-Heinemann, 1995, ch. 11, pp. 139–193.
- [148] Jim Williams, "There's no place like home," in *The Art and Science of Analog Circuit Design*, Jim Williams, Ed. Boston: Butterworth-Heinemann, 1995, ch. 17, pp. 269–277.
- [149] Jim Williams, "The zoo circuit," in *Analog Circuits: World Class Designs*, Robert A. Pease, Ed. Burlington: Newnes, 2008, ch. 18, pp. 393–413.
- [150] Jim Williams, "Something from nothing," *EDN*, Sep. 15, 2005, online collection.
- [151] Jim Williams, "Heavy-duty power supply regulates either voltage, current or power," *EDN*, May 5, 1975.

- [152] Jim Williams, "This 30-ppm scale proves that analog designs aren't dead yet," *EDN*, vol. 21, no. 18, pp. 61–64, Oct. 5, 1976.
- [153] Jim Williams, "Designer's guide to: Temperature sensing," *EDN*, vol. 22, no. 9, pp. 77–84, May 5, 1977.
- [154] Jim Williams, "Designer's guide to: Temperature measurement," *EDN*, vol. 22, no. 10, pp. 71–77, May 20, 1977.
- [155] Jim Williams, "Designer's guide to: Temperature control," *EDN*, vol. 22, no. 12, pp. 87–95, Jun. 20, 1977.
- [156] Jim Williams, "Don't bypass the voltage reference that best suits your needs," *EDN*, vol. 22, no. 18, pp. 53–57, Oct. 5, 1977.
- [157] Jim Williams, "Low-cost, linear A/D conversion uses single-slope techniques," *EDN*, vol. 23, no. 14, pp. 101–104, Aug. 5, 1978.
- [158] Jim Williams, "Test your analog-design IQ," *EDN*, vol. 24, no. 18, pp. 111–116, Oct. 5, 1979.
- [159] Jim Williams, "An elegant 6-IC circuit gauges relative humidity," *EDN*, vol. 25, no. 11, pp. 149–152, Jun. 5, 1980.
- [160] Jim Williams, "A few proven techniques ease sine-wave-generator design," *EDN*, vol. 25, no. 21, pp. 143–152, Nov. 20, 1980.
- [161] Jim Williams, "Low-cost dual, quad FET op amps implement complex functions," *EDN*, vol. 26, no. 1, pp. 159–166, Jan. 7, 1981.
- [162] Jim Williams, "Low-cost instrument measures 4-decade power," *EDN*, vol. 26, no. 3, pp. 137–142, Feb. 4, 1981.
- [163] Jim Williams, "Apply sample-and-hold techniques for elegant design solutions," *EDN*, vol. 26, no. 4, pp. 103–110, Feb. 18, 1981.
- [164] Jim Williams, "High-powered booster circuits enhance op-amp output," *EDN*, vol. 26, no. 11, pp. 117–124, May 27, 1981.
- [165] Jim Williams, "Piezoceramics plus fiber optics boost isolation voltages," *EDN*, vol. 26, no. 13, pp. 149–154, Jun. 24, 1981.
- [166] Jim Williams, "Employ pulse-width modulators in a wide range of controllers," *EDN*, vol. 26, no. 17, pp. 201–205, Sep. 2, 1981.
- [167] Jim Williams, "Increase your design options with analog-MUX ICs," *EDN*, vol. 26, no. 20, pp. 351–356, Oct. 14, 1981.
- [168] Jim Williams, "Exploit D/A converters in unusual controller designs," *EDN*, vol. 26, no. 23, pp. 111–118, Nov. 25, 1981.
- [169] Jim Williams, "Transformers and optocouplers implement isolation techniques," *EDN Magazine*, Jan. 1982.
- [170] Jim Williams, "Use off-the-shelf linear ICs for sophisticated audio designs," *EDN*, vol. 27, no. 5, pp. 109–113, Mar. 3, 1982.
- [171] Jim Williams, "Expand linear circuit functions with nonlinear design schemes," *EDN*, vol. 27, no. 10, pp. 153–158, May 12, 1982.
- [172] Jim Williams, "Current-source alternatives increase design flexibility," *EDN*, vol. 27, no. 17, pp. 169–174, Sep. 1, 1982.
- [173] Jim Williams, "Analog design techniques suit process-control needs," *EDN*, vol. 27, no. 19, pp. 106–112, Sep. 29, 1982.
- [174] Jim Williams, "Conversion techniques adapt voltages to your needs," *EDN*, vol. 27, no. 22, pp. 155–168, Nov. 10, 1982.
- [175] Jim Williams, "Use comparator ICs in new and useful ways," *EDN*, vol. 28, no. 1, pp. 115–128, Jan. 6, 1983.
- [176] Jim Williams and Stan Dendinger, "Use motor-drive IC to solve tricky design problems," *EDN*, vol. 28, no. 10, pp. 195–198, May 12, 1983.
- [177] Jim Williams and Stan Dendinger, "Simplify feedback controllers with a 2-quadrant PWM IC," *EDN*, vol. 28, no. 11, pp. 211–222, May 26, 1983.
- [178] Jim Williams, "Bipolar IC op amps enhance circuit precision," *EDN*, vol. 28, no. 12, pp. 135–46, Jun. 9, 1983.
- [179] Jim Williams, "Basic circuit-design techniques yield stable clock oscillators," *EDN*, vol. 28, no. 17, pp. 165–172, Aug. 18, 1983.
- [180] Jim Williams, "Special circuit-design techniques enhance regulator performance," *EDN*, vol. 28, no. 18, pp. 135–144, Sep. 1, 1983.
- [181] Jim Williams, "Take advantage of thermal effects to solve circuit-design problems," *EDN*, vol. 29, no. 13, pp. 239–246, Jun. 28, 1984.

- [182] Jim Williams, "Monolithic power-buffer IC drives difficult loads," *EDN*, vol. 29, no. 16, pp. 153–159, Aug. 9, 1984.
- [183] Jim Williams, "Monolithic CMOS-switch IC suits diverse applications," *EDN*, vol. 29, no. 20, pp. 183–194, Oct. 4, 1984.
- [184] Jim Williams, "Use low-power design methods to condition battery outputs," *EDN*, vol. 29, no. 21, pp. 307–318, Oct. 18, 1984.
- [185] Jim Williams, "Settling-time measurements demand precise test circuitry," *EDN*, vol. 29, no. 23, pp. 307–314, Nov. 15, 1984.
- [186] Jim Williams, "Circuits allow direct digitization of low-level transducer outputs," *EDN*, vol. 29, no. 24, pp. 183–190, Nov. 29, 1984.
- [187] Jim Williams, "Digitize transducer outputs directly at the source," *EDN*, vol. 30, no. 1, pp. 201–208, Jan. 10, 1985.
- [188] Jim Williams, "Chopper-stabilized monolithic op amp suits diverse uses," *EDN*, vol. 30, no. 4, pp. 305–310, Feb. 21, 1985.
- [189] Jim Williams, "Chopper amplifier improves operation of diverse circuits," *EDN*, vol. 30, no. 5, pp. 189–207, Mar. 7, 1985.
- [190] Jim Williams, "Design linear circuits for 5 V operation," *EDN*, vol. 30, no. 10, pp. 163–174, May 2, 1985.
- [191] Jim Williams, "Design techniques extend V/F-converter performance," *EDN*, vol. 30, no. 11, pp. 153–155, May 16, 1985.
- [192] Jim Williams, "Refine V/F-converter operation with novel design techniques," *EDN*, vol. 30, no. 12, pp. 239–248, May 30, 1985.
- [193] Jim Williams, "Follow design rules for optimum use of fast comparator IC," *EDN*, vol. 30, no. 13, pp. 129–146, Jun. 13, 1985.
- [194] Jim Williams, "Fast comparator IC speeds converters and S/H amplifiers," *EDN*, vol. 30, no. 14, pp. 115–128, Jun. 20, 1985.
- [195] Jim Williams, "Fast comparator IC speeds VCOs and other circuits," *EDN*, vol. 30, no. 15, pp. 221–230, Jun. 27, 1985.
- [196] Jim Williams, "Analog circuits operate from 1.5 V cell," *EDN*, vol. 30, no. 21, pp. 195–205, Sep. 19, 1985.
- [197] Jim Williams, "Test your analog-design IQ, part 2," *EDN*, vol. 31, no. 1, pp. 127–138, Jan. 9, 1986.
- [198] Jim Williams, "Build your own A/D converter for optimum performance," *EDN*, vol. 31, no. 6, pp. 191–198, Mar. 20, 1986.
- [199] Jim Williams, "Boost op-amp output without sacrificing drift and gain specs," *EDN*, vol. 31, no. 11, pp. 131–144, May 29, 1986.
- [200] Jim Williams, "Solve oscillation problems when implementing op-amp power-booster stages," *EDN*, vol. 31, no. 12, pp. 203–207, Jun. 12, 1986.
- [201] Jim Williams, "Composite amplifiers yield high speed and low offset," *EDN*, vol. 32, no. 2, pp. 139–150, Jan. 22, 1987.
- [202] Jim Williams, "Thermal-tracking IC converts RMS to DC," *EDN*, vol. 32, no. 4, pp. 137–151, Feb. 19, 1987.
- [203] Jim Williams, "Designer's guide to micropower circuits. I: Micropower circuits assist low-current signal conditioning," *EDN*, vol. 32, no. 16, pp. 123–132, Aug. 6, 1987.
- [204] Jim Williams, "Signal conditioning circuits use power design techniques," *EDN*, vol. 32, no. 17, pp. 219–234, Aug. 20, 1987.
- [205] Jim Williams, "Regulator IC speeds design of switching power supplies," *EDN*, vol. 32, no. 23, pp. 193–198, Nov. 12, 1987.
- [206] Jim Williams, "Galvanically isolated switching supplies provide high power," *EDN*, vol. 32, no. 24, pp. 191–196, Nov. 26, 1987.
- [207] Jim Williams, "Molded circuits require attention to new design techniques," *EDN*, vol. 33, no. 2, pp. 161–164, Jan. 21, 1988.
- [208] Jim Williams, "Clever techniques improve thermocouple measurements," *EDN*, vol. 33, no. 11, pp. 145–154, May 26, 1988.
- [209] Jim Williams and B. Huffman, "DC/DC converters. I: Precise converter designs enhance system performance," *EDN*, vol. 33, no. 21, pp. 175–185, Oct. 13, 1988.
- [210] Jim Williams and B. Huffman, "DC/DC converters. II: Proper instrumentation eases low-power DC/DC-converter design," *EDN*, vol. 33, no. 22, pp. 285–291, Oct. 27, 1988.

- [211] Jim Williams and B. Huffman, "Designer's guide to DC/DC converters. 3: Design DC/DC converters for power conservation and efficiency," *EDN*, vol. 33, no. 23, pp. 209–218, Nov. 10, 1988.
- [212] Jim Williams and B. Huffman, "Designer's guide to DC/DC converters. 4: Switched-capacitor networks simplify DC/DC-converter designs," *EDN*, vol. 33, no. 24, pp. 171–175, Nov. 24, 1988.
- [213] Jim Williams, "Design linear circuits that serve digital system needs," *EDN*, vol. 34, no. 9, pp. 165–172, Apr. 27, 1989.
- [214] Jim Williams, "Astute designs improve efficiencies of linear regulators," *EDN*, vol. 34, no. 17, pp. 151–158, Aug. 17, 1989.
- [215] Jim Williams, "Basic principles and ingenious circuits yield stout switchers," *EDN*, vol. 35, no. 2, pp. 151–166, Jan. 18, 1990.
- [216] Jim Williams, "Thermal charging circuits safely boost NiCd batteries," *EDN*, vol. 35, no. 11, pp. 152–150, May 24, 1990.
- [217] Jim Williams, "Designers' guide to bridge circuits. I: Good bridge-circuit design satisfies gain and balance criteria," *EDN*, vol. 35, no. 22, pp. 161–172, Oct. 25, 1990.
- [218] Jim Williams, "Designers' guide to bridge circuits. II: AC-driven bridge circuits suit specific applications," *EDN*, vol. 35, no. 23, pp. 229–236, Nov. 8, 1990.
- [219] Jim Williams, "The mysteries of probing," *EDN*, vol. 36, no. 21, pp. 165–175, Oct. 10, 1991.
- [220] Jim Williams, "Correcting power-supply problems," *EDN*, vol. 36, no. 21, pp. 181–186, Oct. 10, 1991.
- [221] Jim Williams, "Subduing high-speed op-amp problems," *EDN*, vol. 36, no. 22, pp. 135–141, Oct. 24, 1991.
- [222] Jim Williams, "High-speed amplifiers with low offset and drift," *EDN*, vol. 36, no. 22, pp. 149–153, Oct. 24, 1991.
- [223] Jim Williams, "High-speed amplifiers in application circuits," *EDN*, vol. 36, no. 22, pp. 157–159, Oct. 24, 1991.
- [224] Jim Williams, "Filters and oscillators," *EDN*, vol. 36, no. 23, pp. 193–198, Nov. 7, 1991.
- [225] Jim Williams, "High-speed data-conversion circuits," *EDN*, vol. 36, no. 23, pp. 211–218, Nov. 7, 1991.
- [226] Jim Williams, "High-speed communications circuits," *EDN*, vol. 36, no. 23, pp. 233–241, Nov. 7, 1991.
- [227] Jim Williams, "Designing supplies for powering LCD backlighting," *EDN*, vol. 37, no. 22, pp. 125–130, Oct. 29, 1992.
- [228] Jim Williams, "Techniques illuminate backlit LCDs with high efficiency," *EDN*, vol. 39, no. 1, pp. 89–90e, Jan. 6, 1994.
- [229] Jim Williams, "Synchronized regulator produces coherent noise," *EDN*, Mar. 17, 1994, online collection.
- [230] Jim Williams, "Pulse generator verifies test setups," *EDN*, May 26, 1994, online collection.
- [231] Jim Williams, "Try fixing it yourself," *EDN*, Feb. 2, 1995, online collection.
- [232] Jim Williams, "Tripping the light fantastic: a case study in circuit design," *EDN*, vol. 40, no. 6, pp. 93–96e, Mar. 16, 1995.
- [233] Jim Williams, "Be it ever so high-tech, there's no place like home," *EDN*, vol. 40, no. 1, pp. 103–104, Jan. 5, 1995.
- [234] Jim Williams, "Avoid pitfalls in dimming and shutting down CCFL backlighting for LCDs," *EDN*, vol. 41, no. 6, pp. 103–106e, Mar. 14, 1996.
- [235] Jim Williams, "Measurements on CCFL-driver circuits pose tricky problems," *EDN*, vol. 41, no. 10, pp. 175–180, May 9, 1996.
- [236] Jim Williams, "0.02% V/F converter consumes only 26 μA ," *EDN*, Jul. 4, 1996, online collection.
- [237] Jim Williams, "Chopped amplifier exacts only 5 μA ," *EDN*, May 22, 1997, online collection.
- [238] Jim Williams, "Switching-regulator design lowers noise to 100 μV ," *EDN*, vol. 42, no. 25, pp. 151–154, Dec. 4, 1997.
- [239] Jim Williams, "Layout and probing techniques ensure low-noise performance," *EDN*, vol. 43, no. 3, pp. 141–144, Feb. 2, 1998.
- [240] Jim Williams, "Fast comparators find their niche in linear applications," *EDN*, Sep. 11, 1998, online collection.

- [241] Jim Williams, "Measuring 16-bit settling times: the art of timely accuracy," *EDN*, vol. 43, no. 24, pp. 159–168, Nov. 19, 1998.
- [242] Jim Williams, "Measuring precision-amplifier settling time," *EDN*, vol. 44, no. 22, pp. 103–112, Oct. 28, 1999.
- [243] Jim Williams, J. Phillips, and G. Vaughn, "A svelte beast cuts high voltage down to size," *EDN*, vol. 44, no. 24, pp. 93–94, Nov. 24, 1999.
- [244] Jim Williams and Todd Owen, "Understanding and selecting rms voltmeters," *EDN*, May 11, 2000, online collection.
- [245] Jim Williams and Todd Owen, "Exacting noise test ensures low-noise performance of low-dropout regulators," *EDN*, vol. 45, no. 10, pp. 149–158, May 11, 2000.
- [246] Jim Williams, "Pulse generator has low top-side aberrations," *EDN*, May 25, 2000, online collection.
- [247] Jim Williams and David Beebe, "Switching-regulator supply provides low-noise biasing for varactor diodes," *EDN*, vol. 45, no. 23, pp. 117–130, Nov. 9, 2000.
- [248] Jim Williams, "Thank you, Bill Hewlett," *EDN*, Feb. 1, 2001, online collection.
- [249] Jim Williams, "20-bit DAC demonstrates the art of digitizing 1 ppm, part 1: exploring design options," *EDN*, vol. 46, no. 8, pp. 95–106, Apr. 12, 2001.
- [250] Jim Williams, "Measurement techniques help hit the 1-ppm mark," *EDN*, vol. 46, no. 9, pp. 117–126, Apr. 26, 2001.
- [251] Jim Williams, "Minimizing thermocouples maintains 20-bit DAC precision," *EDN*, vol. 46, no. 10, p. 83, May 3, 2001.
- [252] Jim Williams, "Controlling the temperature of fiber-optic lasers," *EDN*, vol. 46, no. 15, pp. 99–108, Jul. 5, 2001.
- [253] Jim Williams, "Current sources for fiber-optic lasers: a compendium of pleasant current events," *EDN*, vol. 47, no. 18, pp. 69–78, Aug. 22, 2002.
- [254] Jim Williams, "Bootstrapping allows single-rail op amp to provide 0V output," *EDN*, Feb. 6, 2003, online collection.
- [255] Jim Williams, "Bias-voltage and current-sense circuits make avalanche photodiodes work," *EDN*, vol. 48, no. 5, pp. 83–84, Mar. 6, 2003.
- [256] Jim Williams, "A clock for all reasons, part 1: Monolithic oscillator invigorates instrumentation applications," *EDN*, vol. 48, no. 14, pp. 77–92, Jun. 26, 2003.
- [257] Jim Williams, "A clock for all reasons, part 2: Monolithic oscillator invigorates instrumentation applications," *EDN*, Jul. 10, 2003, online collection.
- [258] Jim Williams, "The taming of the slew," *EDN*, vol. 48, no. 21, pp. 57–64, Sep. 25, 2003.
- [259] Jim Williams and Albert Wu, "Simple circuitry for cellular-telephone/camera-flash illumination," *EDN*, May 27, 2004, online collection.
- [260] Jim Williams, "Simple nanosecond-width pulse generator provides high performance," *EDN*, Nov. 11, 2004, online collection.
- [261] Jim Williams, "Quartz crystal-based remote thermometer features direct celsius readout," *EDN*, Mar. 17, 2005, online collection.
- [262] Jim Williams, "Dynamic-load circuit determines a battery's internal resistance," *EDN*, Mar. 31, 2005, online collection.
- [263] Jim Williams, "1-Hz to 100-MHz VFC features 160-dB dynamic range," *EDN*, Sep. 1, 2005, online collection.
- [264] Jim Williams, "Minimizing switching-regulator residue in linear-regulator outputs," *EDN*, Dec. 5, 2005, online collection.
- [265] Jim Williams, "JFET-based dc/dc converter operates from 300-mV supply," *EDN*, May 25, 2006, online collection.
- [266] Jim Williams, "Load-transient-response testing for voltage regulators," *EDN*, vol. 51, no. 20, pp. 83–96, Sep. 28, 2006.
- [267] Jim Williams, "Designing instrumentation circuitry with rms/dc converters," *EDN*, vol. 53, no. 3, pp. 57–74, Feb. 1, 2007.
- [268] Jim Williams, "Measure nanoamps to ensure accurate computer clocks," *EDN*, May 10, 2007, online collection.
- [269] Jim Williams and Mark Thoren, "Novel measurement circuit eases battery-stack-cell design," *EDN*, vol. 53, no. 1, pp. 47–60, Jan. 10, 2008.
- [270] Jim Williams, "High-voltage, low-noise dc/dc converters," *EDN*, Aug. 7, 2008, online collection.

- [271] Jim Williams and David Bebee, "Diode-turn-on-time-induced failures in switching regulators," *EDN*, vol. 54, no. 1, pp. 26–29, Jan. 8, 2009.
- [272] Jim Williams, "Application engineers: serving the customer," *EDN*, Jun. 25, 2009, online collection.
- [273] Jim Williams, "Characterizing noise in high-performance voltage-reference ICs," *EDN*, vol. 54, no. 17, pp. 35–41, Sep. 3, 2009.
- [274] Jim Williams, "Precisely measure settling time to 1 ppm," *EDN*, vol. 55, no. 5, pp. 20–27, Mar. 4, 2010.
- [275] Jim Williams, "Measuring wideband-amplifier settling time," *EDN*, Aug. 12, 2010, online collection.
- [276] Jim Williams, "Compensate for wiring losses with remote sensing," *EDN*, Nov. 18, 2010, online collection.
- [277] Jim Williams, "An introduction to acoustic thermometry," *EDN*, Apr. 21, 2011, online collection.
- [278] Jim Williams, "DC differential voltmeter resolves 1 microvolt," *Electronics*, vol. 47, no. 14, pp. 116–118, Jul. 11, 1974.
- [279] Jim Williams and T. Durgavich, "Direct-reading converter yields temperature," *Electronics*, vol. 48, no. 7, pp. 101–103, Apr. 3, 1975.
- [280] Jim Williams, "Comparator IC forms 10-bit A/D converter," *Electronics*, vol. 48, no. 8, pp. 146–147, Apr. 17, 1975.
- [281] Jim Williams, "Single-slope A/D converter makes a comeback with 20-bit linearity," *Electronics*, vol. 53, no. 24, pp. 151–155, Nov. 6, 1980.
- [282] Jim Williams, "On-chip transistors add versatility to op amp," *Electronics*, vol. 54, no. 3, pp. 134–135, Feb. 10, 1981.
- [283] Jim Williams, "Dual-function amp chip simplifies many circuits," *Electronics*, vol. 54, no. 9, pp. 142–143, May 5, 1981.
- [284] Jim Williams, "Dual-function amplifier eases circuit design," *Electronics*, vol. 54, no. 15, pp. 136–138, Jul. 28, 1981.
- [285] Jim Williams, "Bi-FET op amps invade 741's general-purpose domain," *Electronics*, vol. 54, no. 22, pp. 134–135, Nov. 3, 1981.
- [286] Jim Williams, "Bi-FETs expand applications for general-purpose op amps," *Electronics*, vol. 54, no. 23, pp. 122–123, Nov. 17, 1981.
- [287] Jim Williams, "Inexpensive voltage multiplier is simple and efficient," *Electronic Design*, Mar. 25 1974, wrong date.
- [288] Jim Williams, "Split a temperature degree to 10 microdegrees," *Electronic Design*, vol. 22, no. 10, pp. 102–107, May 10, 1974.
- [289] Jim Williams, "Boost transistor-level supply voltages to make a low-power, high-voltage supply," *Electronic Design*, vol. 22, no. 21, p. 126, Oct. 11, 1974.
- [290] Jim Williams, "Prevent low-level amplifier problems," *Electronic Design*, vol. 23, no. 4, pp. 62–67, Feb. 15, 1975.
- [291] Jim Williams, "Float your input amplifier," *Electronic Design*, vol. 25, no. 4, pp. 100–103, Feb. 15, 1977.
- [292] Jim Williams, "IC comparators-at home in nearly any circuit," *Electronic Design*, vol. 29, no. 5, pp. 123–126, Mar. 5, 1981.
- [293] Jim Williams, "MDACs control frequency-not just amplitude-of signals," *Electronic Design*, vol. 29, no. 6, pp. 259–261, Mar. 19, 1981.
- [294] Jim Williams, "IC instrumentation amp enhances transducer measurements," *Electronic Design*, vol. 29, no. 16, pp. 203–206, Aug. 6, 1981.
- [295] Jim Williams, "Design DC-DC converters to catch noise at the source," *Electronic Design*, vol. 29, no. 21, pp. 229–234, Oct. 15, 1981.
- [296] Jim Williams, "Simple techniques fine-tune sample-hold performance," *Electronic Design*, vol. 29, no. 23, pp. 235–238, Nov. 12, 1981.
- [297] Jim Williams, " μ P-controlled measurements sharpen industrial processes," *Electronic Design*, vol. 29, no. 25, pp. 161–166, Dec. 10, 1981.
- [298] G. Erdi and Jim Williams, "Precision op amp serves host of design needs," *Electronic Design*, vol. 31, no. 18, pp. 95–102, Sep. 1, 1983.
- [299] Jim Williams, "Simple test jig plus VCO chip matches capacitor pairs," *Electronic Design*, vol. 32, no. 3, pp. 156–158, Feb. 9, 1984.
- [300] N. Sevastopoulos and Jim Williams, "Charge-nulled CMOS switch lets op amps tackle precision analog tasks," *Electronic Design*, vol. 32, no. 20, pp. 195–202, Oct. 4, 1984.

- [301] Jim Williams, "V-F converter offers 120-dB dynamic range," *Electronic Design*, vol. 32, no. 20, pp. 276–278, Oct. 4, 1984.
- [302] Jim Williams and T. Redfern, "Nanoampere comparator IC with stable offset manages inputs unaided," *Electronic Design*, vol. 33, no. 10, pp. 107–116, May 2, 1985.
- [303] Jim Williams, "High resolution scale: Measures up to 250 lb \pm 0.01 lb, detects a single bite of food," *Analog Dialogue*, vol. 10, no. 2, p. 17, 1976.
- [304] George Erdi and Jim Williams, "A universal precision operational amplifier," *Electronic Engineering*, vol. 55, no. 683, pp. 141–147, Nov. 1983.
- [305] Jim Williams, "Performance-enhancement techniques for three-terminal regulators," *New Electronics*, vol. 16, no. 19, pp. 61–62, Oct. 4, 1983.
- [306] Jim Williams, "ASICs versus standard linear: Why op amps are not 12AX7s," *ESD: The Electronics System Design Magazine*, Sep. 1987.
- [307] Jim Williams, "A prescription for linear ASIC's," *VLSI Systems Design*, Nov. 1988.
- [308] Jim Williams, "Analog circuit content gets ready for 3.3 volt handheld computers," *Electronic Engineering Times*, Sep. 28 1992.
- [309] Jim Williams, "Board-level designers face tough challenges," *Electronic Design Analog Applications*, Jun. 22 1999.
- [310] Jim Williams and B. Waller, "Multifunction voltage regulator," *Electronic Product Design*, vol. 4, no. 6, pp. 43–50, Jun. 1983.
- [311] Jim Williams and P. Adams, "Accurate 3-terminal voltage regulators," *Electronic Product Design*, vol. 5, no. 2, pp. 41–44, Feb. 1984.
- [312] Jim Williams, "Switching regulator takes on more power," *Electronic Product Design*, vol. 7, no. 1, pp. 25–28, Jan. 1986.
- [313] N. Catsimpooolas, A. L. Griffith, J. M. Williams, A. Chrambach, and D. Rodbard, "Electrophoresis with continuous scanning densitometry: Separation of cells in a density gradient," *Analytical Biochemistry*, vol. 69, no. 2, pp. 372–384, Dec. 1975.
- [314] James M. Williams and Nicholas Catsimpooolas, "A highly regulated, recording constant power, voltage, and current supply for electrophoresis and isoelectric focusing," *Analytical Biochemistry*, vol. 71, no. 2, pp. 555–563, Apr. 1976.
- [315] J. M. Williams and T. L. Longman, "A 25MHz thermally based RMS-to-DC converter," in *IEEE ISSCC Digest of Technical Papers*, Feb. 1986, pp. 20–21.
- [316] Jim Williams, "Circuitry for high speed amplifiers," in *Wescon/86 Conference Record*, 1986, p. 15.
- [317] Jim Williams, "Transformers and optocouplers implement isolation techniques," *EDN*, (unknown date) before 1985, in EDN book 1.
- [318] Jim Williams, "Exotic-transducer interfacing calls for proven techniques," *EDN*, (unknown date) before 1985, in EDN book 1.
- [319] Jim Williams, "Interface nonstandard sensors using standard circuit methods," *EDN*, (unknown date) before 1985, in EDN book 1.

Revision History

- v0.1 Linear Technology application notes¹⁵ and “Analog Circuit Design” books (72 references)
- v0.2 National Semiconductor application notes¹⁶ and EDN “Designer’s Guide” books (95 references)
- v0.3 Magazine articles culled from the references in LT app notes (113 references)
- v0.4 EDN articles culled from EDN books and EDN on-line listing¹⁷ (220 references)
- v0.5 Adding LTC design notes and data from various online sources and databases (288 references, that’s over 80% of 350 found!)
- v0.6 First public release, 31 July 2011
- v0.7 Added data on final book [141] in Section 5.4 and did a little reformatting
- v0.8 Added information received from Siu Williams, also Appendix A, more articles from LT Magazine, [89] and [149] (319 references)

Known Errors

Other than being incomplete, there are no known errors in this list.

- The footnotes in the text detail some of the missing information
- Some EDN articles are missing volume, number, and pages
- Some EDN articles have page numbers from the European Edition (postfix e)
- I do not plan to include foreign-language translations in this bibliography

Please contact the author if you find any omissions, errors, or other problems.

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¹⁵<http://www.linear.com/doclist/?au=Jim+Williams>

¹⁶<http://web.mit.edu/klund/www/jw/jw-nsc.html>

¹⁷http://www.edn.com/article/472111-Jim_Williams.php

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Colophon

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@IEEEtranBSTCTL{BSTcontrol,  
  CTLdash_repeated_names = "no",  
  CTLname_format_string = "{ff }{vv~}{11}{, jj}", }
```

About the Compiler

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His web site is <http://web.mit.edu/klund/www/>.

¹⁸<http://miktex.org/>

¹⁹<http://www.michaelshell.org/tex/ieeetran/bibtex/>