Stanford



Bradford Parkinson

Edward C. Wells Professor in the School of Engineering, Emeritus

Aeronautics and Astronautics

CONTACT INFORMATION

- **Administrator**

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Bio

BIO

Professor Bradford Parkinson was the Chief Architect for GPS, and led the original advocacy for the system in 1973 as an Air Force Colonel. Gaining approval, he became the first Director of the GPS Joint Program Office and led the original development of spacecraft, Master Control Station and 8 types of User Equipment. He continued leadership of the Program through the extensive test validation Program, including being the Launch Commander for the first GPS satellite launches. This original deployment of GPS demonstrated comfortable margins against all PNT (Positioning, Navigation, and Timing) requirements.

Earlier in his career, he was a key developer of a modernized AC-130 Gunship, introduction of which included 160 hours of combat missions. He was an instructor at the USAF Test Pilot School. In addition he led the Department of Astronautics and Computer Science at the US Air Force Academy. He retired from the US Air Force as a Colonel.

He was appointed a Professor at Stanford University in 1984, after six years of experience in industry. At Stanford University, he led the development of many innovative applications of GPS, including:

1. Commercial aircraft (Boeing 737) blind landing using GPS alone,

2. Fully automatic GPS control of Farm Tractors on a rough field to an accuracy of 2 inches,

3. Pioneering the augmentation to GPS (WAAS) that allows any user to achieve accuracies of 2 feet and very high levels of integrity assurance.

He has been the CEO of two companies, and serves on many boards. He is the editor/author of the AIAA Award winning 2 Volumes: “GPS Theory and Applications” and is author or coauthor of over 80 technical papers.

Among his many awards is the Draper Prize of the National Academy of Engineering, considered by some to be the “Engineering Nobel”.

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Aeronautics and Astronautics

HONORS AND AWARDS

- Medal of Honor, IEEE (2018)
- Honorary Fellow, AIAA (2017)
- Marconi Award, The Marconi Society (2016)

- Hall of Fame, Engineer's Club of Dayton (2015)
- Honorary Fellow, Royal Institute of Navigation (2014)
- Engineering Hero, Stanford University (2012)
- Necho Award, International Association of Institutes of Navigation (2012)
- The Rheim Technology Prize, Eduard Rheim Institute, Munich (2012)
- Distinguished Graduate, US Naval Academy (2011)
- Pioneer's Award, US Space Command (2009)
- Lloyd Berkner Award, American Astronautical Society (2008)
- Silicon Valley Hall of Fame, Silicon Valley Engineering Council (2007)
- Goddard Astronautics Award, AIAA (2006)
- ASME Gold Medal Award, American Society of Mechanical Engineers (2004)
- Fellow, IEEE (2004)
- Member, National Inventors Hall of Fame (2004)
- Charles Stark Draper Prize, NAE (2003)
- Discover Innovation Award for Communications, Discover Magazine (2002)
- Simon Ramo Award, IEEE (2002)
- Distinguished Public Service Medal, NASA (2001)
- Fellow, The Institute of Navigation (ION) (1999)
- Hall of FAME, NASA (1998)
- Sperry Award, IEEE (1998)
- Magellanic Premium Award, American Philosophical Society (1997)
- Member, International Academy of Astronautics (IAA) (1997)
- Von Karman Lectureship, AIAA (1996)
- Edward C Wells Professor of Aeronautics & Astronautics, Stanford University (1995)
- GPS Hall of Fame Award, NAVSTAR Joint Program Office (1995)
- Pioneer Award, AESS/IEEE (1994)
- Public Service Medal, NASA (1994)
- Johannes Kepler Award, ION (1991)
- Fellow, The Royal Institute of Navigation (1990)
- Fellow, American Institute of Aeronautics & Astronautics (AIAA) (1990)
- Member, National Academy of Engineers (NAE) (1990)
- Burka Award, ION (1987)
- Kirschner Award, IEEE (1986)
- Thurlow Award, ION (1986)
- Engineer of the Year for Silicon Valley, AIAA (1985)
- Gold Medal Award, Royal Inst. of Navigation (1983)
- Legion of Merit, US Air Force (1978)
- Defense Department Superior Performance Award, NAVSTAR (GPS) GPO (1977)
- Bronze Star, US Air Force (1970)

- Presidential Unit Citation, Dept. Of Defense (1970)
- Air Medals (2), US Air Force (1969)
- Member, Sigma Xi (1961)
- Member, Tau Beta Pi (MIT Chapter) (1961)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, National Academy of Engineering (2013 - present)

PROFESSIONAL EDUCATION

- PhD, Stanford University (1966)

Publications

PUBLICATIONS

- **Gravity Probe B data analysis: III. Estimation tools and analysis results** *CLASSICAL AND QUANTUM GRAVITY*
  Conklin, J. W., Heifetz, M. I., Holmes, T., Al-Meshari, M., Parkinson, B. W., Silbergleit, A. S., Everitt, C. W., Al-Jaadan, A., Keiser, G. M., Muhlfelder, B., Solomonik, V. G., Al-Jabreen, H.
  2015; 32 (22)

- **Gravity Probe B: Final Results of a Space Experiment to Test General Relativity** *PHYSICAL REVIEW LETTERS*
  Everitt, C. W., DeBra, D. B., Parkinson, B. W., Turneaure, J. P., CONKLIN, J. W., Heifetz, M. I., Keiser, G. M., Silbergleit, A. S., Holmes, T., Kolodziejczak, J., Al-Meshari, M., Mester, J. C., Muhlfelder, et al
  2011; 106 (22)

- **Looking Ahead for GPtS** *23rd International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GNSS-2010)*
  Parkinson, B.
  INST NAVIGATION.2010: 1–45

- **Gravity Probe B Data Analysis** *Workshop on Probing the Nature of Gravity - Confronting Theory and Experiment in Space*
  Everitt, C. W., Adams, M., Bencze, W., Buchman, S., Clarke, B., CONKLIN, J. W., DeBra, D. B., DOLPHIN, M., Heifetz, M., Hipkins, D., Holmes, T., Keiser, G. M., Kolodziejczak, et al
  SPRINGER.2009: 53–69

- **Gravity Probe B(*)** *RIVISTA DEL NUOVO CIMENTO*
  Keiser, G. M., Adams, M., BENCZE, W. J., BRUMLEY, R. W., Buchman, S., Clarke, B., Conklin, J., DeBra, D. B., DOLPHIN, M., HIPKINS, D. N., Holmes, T., Everitt, C. W., Goebel, et al
  2009; 32 (11): 555-589

- **Gravity Probe B data analysis status and potential for improved accuracy of scientific results** *18th International Conference on General Relativity and Gravitation/7th Edoardo Amaldi Conference on Gravitational Waves*
  Everitt, C. W., Adams, M., Bencze, W., Buchman, S., Clarke, B., Conklin, J., DeBra, D. B., DOLPHIN, M., Heifetz, M., Hipkins, D., Holmes, T., Keiser, G. M., Kolodziejczak, et al
  IOP PUBLISHING LTD.2008

- **Gravity probe B - Testing Einstein at the limits of engineering** *3rd International Conference on Particle and Fundamental Physics in Space*
  BENCZE, W. J., Buchman, S., Clarke, B., DeBra, D., Everitt, C. W., Green, G., Heifetz, M. I., HIPKINS, D. N., Keiser, G. M., Li, J., Lipa, J. A., Muhlfelder, B., Parkinson, et al
  ELSEVIER SCIENCE BV.2007: 147–152

- **Cascaded Kalman filters for accurate estimation of multiple biases, dead-reckoning navigation, and full state feedback control of ground vehicles** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
  Bevly, D. M., Parkinson, B.
  2007; 15 (2): 199-208

- **Calibration of strapdown magnetometers in magnetic field domain** *JOURNAL OF AEROSPACE ENGINEERING*
  Gebre-Egziabher, D., Elkaim, G. H., Powel, J. D., Parkinson, B. W.
  2006; 19 (2): 87-102

- **Gravitational experiments in space: Gravity probe B and STEP** *2nd International Conference on Particle and Fundamental Physics in Space*
  Mester, J., Buchman, S., Cruise, A. M., DeBra, D., Dittus, H., Everitt, C. W., Foulon, B., Keiser, G. M., Kent, B. J., Lipa, J., Lockerbie, N., Lockhart, J. M., Loeffler, et al
  ELSEVIER SCIENCE BV.2004: 147–154

- **Effect of the error in line of sight unit vector on the accuracy of GPS and pseudolite navigation system** *COMPUTERS & MATHEMATICS WITH APPLICATIONS*
  Kee, C., Kim, J., So, H., Jun, H., Parkinson, B.
  2004; 48 (5-6): 779-787

- **A new yaw dynamic model for improved high speed control of a farm tractor** *JOURNAL OF DYNAMIC SYSTEMS MEASUREMENT AND CONTROL-TRANSACTIONS OF THE ASME*
  Bevly, D. M., Gerdes, J. C., Parkinson, B. W.
  2002; 124 (4): 659-667

- **Credibility of GP-B'S gyroscopic test of general relativity** *25th Annual AAS Rocky Mountain Guidance and Control Conference*
  Debra, B., Parkinson, B., Kaiser, G., Everitt, F., Buchman, S.
  UNIVELT INC.2002: 271–281

- **Cryogenic gyroscopes for the relativity mission** *22nd International Conference on Low Temperature Physics*
  Buchman, S., Everitt, C. W., Parkinson, B., Turneaure, J. P., Keiser, G. M.
  ELSEVIER SCIENCE BV.2000: 497–98

- **The Gravity Probe B relativity mission** *HO 1 Symposium of COSPAR Scientific Commission H Held at the 32nd COSPAR Scientific Assembly*
  Buchman, S., Everitt, C. W., Parkinson, B., Turneaure, J. P., DeBra, D., Bardas, D., Bencze, W., Brumley, R., Gill, D., Gutt, G., Gwo, D. H., Keiser, G. M., Lipa, et al
  PERGAMON PRESS LTD.2000: 1177–80

- **Use of global positioning system for gravity probe B relativity experiment and co-experiments** *HO 1 Symposium of COSPAR Scientific Commission H Held at the 32nd COSPAR Scientific Assembly*
  Uematsu, H., Ward, L., Parkinson, B. W.
  PERGAMON PRESS LTD.2000: 1199–1203

- **Gyroscopes and charge control for the Relativity Mission Gravity Probe B** *HO 1 Symposium of COSPAR Scientific Commission H Held at the 32nd COSPAR Scientific Assembly*
  Buchman, S., Everitt, C. W., Parkinson, B., Turneaure, J. P., Brumley, R., Gill, D., Keiser, G. M., Xiao, Y.
  PERGAMON PRESS LTD.2000: 1181–84

- **System identification and adaptive steering of tractors utilizing differential Global Positioning System** *JOURNAL OF GUIDANCE CONTROL AND DYNAMICS*
  Rekow, A., Bell, T., Bevly, D., Parkinson, B.
  1999; 22 (5): 671-674

- **Control of flexible structures using GPS: Methods and experimental results** *JOURNAL OF GUIDANCE CONTROL AND DYNAMICS*
  Teague, E. H., How, J. P., Parkinson, B. W.
  1998; 21 (5): 673-683

- **Realistic autofarming closed-loop tractor control over irregular paths using kinematic GPS** *JOURNAL OF NAVIGATION*
  Bell, T., O'Connor, M., Jones, V. K., Rekow, A., Elkaim, G., Parkinson, B.
  1998; 51 (3): 327-335

- **Autonomous fault detection and removal using GPS carrier phase** *IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS*
  Pervan, B. S., Lawrence, D. G., Parkinson, B. W.
  1998; 34 (3): 897-906

- **LMS identification of systems with dynamics and an output deadzone** *American Control Conference*
  Rekow, A., Jones, V. K., Parkinson, B.
  IEEE.1998: 2770–2774

- **Cycle ambiguity estimation for aircraft precision landing using the global positioning system** *JOURNAL OF GUIDANCE CONTROL AND DYNAMICS*

Pervan, B. S., Parkinson, B. W.
1997; 20 (4): 681-689

- **Origins, evolution, and future of satellite navigation** *AIAA 34th Aerospace Sciences Meeting and Exhibit*
  Parkinson, B. W.
  AMER INST AERONAUT ASTRONAUT.1997: 11–25

- **The application of LEOS to cycle ambiguity resolution on Navstar transmissions for kinematic carrier-phase positioning** *10th International Technical Meeting of the Satellite Division of the Institute-of-Navigation*
  Rabinowitz, M., Parkinson, B. W., Cohen, C. E.
  INST NAVIGATION.1997: 867–881

- **Operational experience with and improvements to a tunnel-in-the-sky display for light aircraft** *10th International Technical Meeting of the Satellite Division of the Institute-of-Navigation*
  Barrows, A. K., Alter, K. W., Enge, P., Parkinson, B. W., Powell, J. D.
  INST NAVIGATION.1997: 791–799

- **Flight test evaluation of a prototype local area augmentation system architecture** *10th International Technical Meeting of the Satellite Division of the Institute-of-Navigation*
  Pervan, B., LAWRENCE, D., Gromov, K., Opshaug, G., Christie, J., Ko, P. Y., Mitelman, A., Pullen, S., Enge, P., Parkinson, B.
  INST NAVIGATION.1997: 1613–1621

- **Real-time CDGPS initialization for land vehicles using a single pseudolite** *ION National Meeting on Navigation and Positioning in the Information Age*
  O'Connor, M., Bell, T., Elkaim, G., Parkinson, B.
  INST NAVIGATION.1997: 717–724

- **System identification and robust control of farm vehicles using CDGPS** *10th International Technical Meeting of the Satellite Division of the Institute-of-Navigation*
  Elkaim, G., O'Connor, M., Bell, T., Parkinson, B.
  INST NAVIGATION.1997: 1415–1424

- **System identification of an autonomous aircraft using GPS** *10th International Technical Meeting of the Satellite Division of the Institute-of-Navigation*
  Evans, J., Elkaim, G., Lo, S., Parkinson, B.
  INST NAVIGATION.1997: 1065–1071

- **Optimal augmentation of GPS using inexpensive geosynchronous navigation satellites** *10th International Technical Meeting of the Satellite Division of the Institute-of-Navigation*
  Pullen, S., Parkinson, B.
  INST NAVIGATION.1997: 1271–1281

- **Comparison of master station and user algorithms for wide-area augmentation system** *JOURNAL OF GUIDANCE CONTROL AND DYNAMICS*
  Kee, C., Walter, T., Chao, Y. C., Tsai, Y. J., Enge, P., Parkinson, B. W.
  1997; 20 (1): 170-176

- **Experimental techniques for gyroscope performance enhancement for the gravity probe B relativity mission** *Symposium on Fundamental Physics in Space (STEP, LISA and Other Space Projects)*
  Buchman, S., Everitt, F., Parkinson, B., Turneaure, J., Keiser, M., Taber, M., Bardas, D., Lockhart, J., Muhlfelder, B., Mester, J., Xiao, Y. M., Gutt, G., Gill, et al
  IOP PUBLISHING LTD.1996: A185–A191

- **Optimal recursive iterative algorithm for discrete nonlinear least-squares estimation** *JOURNAL OF GUIDANCE CONTROL AND DYNAMICS*
  Haupt, G. T., Kasdin, N. J., Keiser, G. M., Parkinson, B. W.
  1996; 19 (3): 643-649

- **Wide area differential GPS (WADGPS): Future navigation system** *IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS*
  Kee, C. D., Parkinson, B. W.
  1996; 32 (2): 795-808

- **Applications of superconductivity to space-based gravitational experiments** *21st International Conference on Low Temperature Physics (LT 21)*
  Buchman, S., Taber, M., Lockhart, J., Muhlfelder, B., Everitt, C. W., Turneaure, J. P., Parkinson, B.
  INST PHYSICS ACAD SCI CZECH REPUBLIC.1996: 2869–2870

- **Generation of ionospheric correction and confidence estimates for WAAS** *52nd Annual Meeting of the Institute-of-Navigation on Navigational Technology for the 3rd Millenium*
  Chao, Y. C., Tsai, Y. J., Evans, J., Kee, C., Walter, T., ENGE, P. K., Powell, J. D., Parkinson, B. W.
  INST NAVIGATION.1996: 139–146

- **Control system optimization with unbounded uncertainty: Application to aircraft precision approach using GPS** *35th IEEE Conference on Decision and Control*
  Pullen, S. P., ENGE, P. K., Parkinson, B. W.
  IEEE.1996: 1339–1340

- **Gyroscope spin axis direction control for the Gravity Probe B satellite** *35th IEEE Conference on Decision and Control*
  BENCZE, W. J., Xiao, Y. M., HIPKINS, D. N., Franklin, G. F., Parkinson, B. W.
  IEEE.1996: 480–485

- **Quality control algorithms on Wide-area Reference Station for WAAS** *52nd Annual Meeting of the Institute-of-Navigation on Navigational Technology for the 3rd Millenium*
  Kee, C., Walter, T., Enge, P., Parkinson, B.
  INST NAVIGATION.1996: 487–495

- **Effects of local ionospheric anomalies on navigation performance and integrity using WAAS** *IEEE 1996 Position Location and Navigation Symposium (PLANS 96)*
  Pullen, S. P., Chao, Y. C., ENGE, P. K., Parkinson, B. W.
  I E E E.1996: 574–581

- **Integration of wide area DGPS with local area kinematic DGPS** *IEEE 1996 Position Location and Navigation Symposium (PLANS 96)*
  LAWRENCE, D., Evans, J., Chao, Y. C., Tsai, Y. J., Cohen, C., Walter, T., Enge, P., Powell, J. D., Parkinson, B.
  I E E E.1996: 523–529

- **Techniques for real-time control of flexible structures using GPS** *Annual Rocky Mountain Guidance and Control Conference*
  Teague, E. H., How, J. P., Lawson, L. G., Boerjes, M., Parkinson, B. W.
  UNIVELT INC.1996: 429–438

- **Parity space methods for autonomous fault detection and exclusion using GPS carrier phase** *IEEE 1996 Position Location and Navigation Symposium (PLANS 96)*
  Pervan, B. S., Lawrence, D. G., Cohen, C. E., Parkinson, B. W.
  I E E E.1996: 649–656

- **Incorporation of orbital dynamics to improve wide-area differential GPS** *8th International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GPS-95)*
  Ceva, J., Parkinson, B., Bertiger, W., Muellerschoen, R., Yunck, T.
  INST NAVIGATION.1995: 647–659

- **Precision landing tests with improved integrity beacon pseudolites** *8th International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GPS-95)*
  COBB, H. S., LAWRENCE, D., Pervan, B., Cohen, C., Powell, J. D., Parkinson, B.
  INST NAVIGATION.1995: 827–833

- **The Stanford Relativity Mission "Niobium Bird": Verification of the science mission by experimental application of a new nonlinear estimation algorithm** *Annual Rocky-Mountain Guidance and Control Conference*
  Haupt, G. T., Gutt, G. M., Lockhart, J. M., Kasdin, N. J., Keiser, G. M., Parkinson, B. W.
  UNIVELT INC.1995: 3–18

- **Autolanding a 737 using GPS and integrity beacons** *AIAA/IEEE 14th Digital Avionics Systems Conference (14th DASC)*
  Cohen, C. E., COBB, H. S., Lawrence, D. G., Pervan, B. S., Powell, J. D., Parkinson, B. W., Aubrey, G. J., Loewe, W., Ormiston, D., MCNALLY, B. D., Kaufmann, D. N., Wullschleger, V., Swider, et al
  I E E E.1995: 474–482

- **Observed GPS signal continuity interruptions** *8th International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GPS-95)*
  COBB, H. S., LAWRENCE, D., Christie, J., Walter, T., Chao, Y. C., Powell, J. D., Parkinson, B.
  INST NAVIGATION.1995: 793–795
- **Kinematic GPS for closed-loop control or farm and construction vehicles** *8th International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GPS-95)*
  OConnor, M., Elkaim, G., Parkinson, B.
  INST NAVIGATION.1995: 1261–1268
- **Precision landing tests with improved integrity beacon pseudolites** *8th International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GPS-95)*
  COBB, H. S., LAWRENCE, D., Pervan, B., Cohen, C., Powell, J. D., Parkinson, B.
  INST NAVIGATION.1995: 827–833
- **The Stanford Relativity Mission "Niobium Bird": Verification of the science mission by experimental application of a new nonlinear estimation algorithm** *Annual Rocky-Mountain Guidance and Control Conference*
  Haupt, G. T., Gutt, G. M., Lockhart, J. M., Kasdin, N. J., Keiser, G. M., Parkinson, B. W.
  UNIVELT INC.1995: 3–18
- **Autolanding a 737 using GPS and integrity beacons** *AIAA/IEEE 14th Digital Avionics Systems Conference (14th DASC)*
  Cohen, C. E., COBB, H. S., Lawrence, D. G., Pervan, B. S., Powell, J. D., Parkinson, B. W., Aubrey, G. J., Loewe, W., Ormiston, D., MCNALLY, B. D., Kaufmann, D. N., Wullschleger, V., Swider, et al
  I E E E.1995: 474–482
- **Observed GPS signal continuity interruptions** *8th International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GPS-95)*
  COBB, H. S., LAWRENCE, D., Christie, J., Walter, T., Chao, Y. C., Powell, J. D., Parkinson, B.
  INST NAVIGATION.1995: 793–795
- **Kinematic GPS for closed-loop control or farm and construction vehicles** *8th International Technical Meeting of the Satellite Division of the Institute-of-Navigation (ION GPS-95)*
  OConnor, M., Elkaim, G., Parkinson, B.
  INST NAVIGATION.1995: 1261–1268
- **HISTORY AND OPERATION OF NAVSTAR, THE GLOBAL POSITIONING SYSTEM** *IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS*
  Parkinson, B. W.
  1994; 30 (4): 1145-1161
- **SPACE-FLIGHT TESTS OF ATTITUDE DETERMINATION USING GPS** *INTERNATIONAL JOURNAL OF SATELLITE COMMUNICATIONS*
  Cohen, C. E., Lightsey, E. G., Parkinson, B. W., FEESS, W. A.
  1994; 12 (5): 427-433
- **WIDE AREA DIFFERENTIAL GPS AS A FUTURE NAVIGATION SYSTEM IN THE UNITED-STATES** *IEEE 1994 Position Location and Navigation Symposium*
  Kee, C., Parkinson, B. W.
  I E E E.1994: 788–795
- **SIMULATION-BASED EVALUATION OF WAAS PERFORMANCE - RISK AND INTEGRITY FACTORS** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*
  Pullen, S., Enge, P., Parkinson, B.
  INST NAVIGATION.1994: 975–983
- **DEVELOPMENT OF A GPS RECEIVER FOR RELIABLE REAL-TIME ATTITUDE DETERMINATION IN SPACE** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*
  Lightsey, E. G., Cohen, C., Parkinson, B.
  INST NAVIGATION.1994: 1677–1684
- **FLIGHT TRIALS OF THE WIDE AREA AUGMENTATION SYSTEM (WAAS)** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*

Walter, T., Kee, C., Chao, Y. C., Tsai, Y. J., PELED, U., Ceva, J., Barrows, A., Abbot, E., Powell, J. D., Enge, P., Parkinson, B.
INST NAVIGATION.1994: 1537–1546

- **System design under uncertainty: Evolutionary optimization of the Gravity Probe-B spacecraft** *3rd International Conference on Parallel Problem Solving from Nature (PPSN III)*
  Pullen, S. P., Parkinson, B. W.
  SPRINGER-VERLAG BERLIN.1994: 598–607
- **FLIGHT TEST RESULTS OF AUTOCOUPLED APPROACHES USING GPS AND INTEGRITY BEACONS** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*
  Cohen, C., LAWRENCE, D., Pervan, B., COBB, H. S., Barrows, A., Powell, J. D., Parkinson, B., Wullschleger, V., Kalinowski, S.
  INST NAVIGATION.1994: 1145–1153
- **KINEMATIC GPS LANDING SYSTEM ARCHITECTURE AND FLIGHT TEST-RESULTS** *1994 IEEE National Telesystems Conference/1994 International Microwave Symposium*
  Cobb, S., Cohen, C., Parkinson, B.
  I E E E.1994: 101–101
- **AUTONOMOUS INTEGRITY MONITORING FOR GPS-BASED PRECISION LANDING USING GROUND-BASED INTEGRITY BEACON PSEUDOLITES** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*
  Pervan, B., Cohen, C., LAWRENCE, D., COBB, H. S., Powell, J. D., Parkinson, B.
  INST NAVIGATION.1994: 609–618
- **CALIBRATION OF MULTIPATH ERRORS ON GPS PSEUDORANGE MEASUREMENTS** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*
  Kee, C. D., Parkinson, B.
  INST NAVIGATION.1994: 353–362
- **A NEW APPROACH TO GPS INTEGRITY MONITORING USING PRIOR PROBABILITY-MODELS AND OPTIMAL THRESHOLD SEARCH** *IEEE 1994 Position Location and Navigation Symposium*
  Pullen, S. P., Pervan, B. S., Parkinson, B. W.
  I E E E.1994: 739–746
- **ANALYSIS OF ANGULAR VELOCITY DETERMINATION USING GPS** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*
  Montgomery, P., Uematsu, H., Parkinson, B.
  INST NAVIGATION.1994: 697–706
- **ANTENNA BASELINE AND LINE BIAS ESTIMATION USING PSEUDOLITES FOR GPS-BASED ATTITUDE DETERMINATION** *7th International Technical Meeting of the Satellite-Division of the Institute-of-Navigation (ION GPS-94)*
  Uematsu, H., Parkinson, B.
  INST NAVIGATION.1994: 717–726
- **THEORY AND DESIGN OF PSEUDOLITES** *1994 National Technical Meeting on Navigating the Earth and Beyond*
  COBB, H. S., Cohen, C. E., Parkinson, B. W.
  INST NAVIGATION.1994: 69–75
- **ANALYSIS OF SPACECRAFT ATTITUDE MEASUREMENTS USING ONBOARD GPS** *Annual Rocky Mountain Guidance and Control Conference*
  Lightsey, E. G., Cohen, C. E., FEESS, W. A., Parkinson, B. W.
  UNIVELT INC.1994: 521–532
- **Ultra precision machining: Quiet hydraulics and computer support research** *1995 NSF Design and Manufacturing Grantees Conference*
  DeBra, D. B., Parkinson, B. W., Hesselink, L., Binford, T. O., Peirce, S., Frants, L., Huang, J. J., Kietzman, J., Velezmoro, M.
  SOC MANUFACTURING ENGINEERS.1994: 313–314
- **FLIGHT TESTS OF ATTITUDE DETERMINATION USING GPS COMPARED AGAINST AN INERTIAL MEASUREMENT UNIT** *National Technical Meeting of the Institute-of-Navigation on Evolution Through Integration of Current and Emerging Systems*
  Cohen, C. E., Parkinson, B. W., MCNALLY, B. D.
  INST NAVIGATION.1993: 579–587
- **THE GRAVITY PROBE-B NIOBIUM BIRD EXPERIMENT - VERIFYING THE DATA REDUCTION SCHEME FOR ESTIMATING THE RELATIVISTIC PRECESSION OF EARTH-ORBITING GYROSCOPES** *AAS/AIAA Spaceflight Mechanics Meeting*

Uematsu, H., Parkinson, B. W., Lockhart, J. M., Muhlfelder, B.
UNIVELT INC.1993: 1375–1393

- **ESTIMATION OF GYROSCOPE POLHODE MOTION USING TRAPPED MAGNETIC-FLUX** *JOURNAL OF GUIDANCE CONTROL AND DYNAMICS*
  Cohen, C. E., Keiser, G. M., Parkinson, B. W.
  1992; 15 (1): 152-158
- **ALGORITHMS AND IMPLEMENTATION OF WIDE AREA DIFFERENTIAL GPS** *5TH INTERNATIONAL TECHNICAL MEETING OF THE SATELLITE DIVISION OF THE INST OF NAVIGATION : ION GPS-92*
  Kee, C., Parkinson, B. W.
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