

Hubble Space Telescope Manuscript Collection

Description and Finding Aid

2.7 linear feet (6 file boxes)

Processor: Zinaida Tsemel

Date of processing: 2014

Acquisition: The Hubble Space Telescope (HST) Papers were received by the Norwalk Public Library from the Norwalk Museum during the restructuring of the Museum in 2013.

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Introduction

The HST was funded in the 1970s and was originally set to launch in 1983, but due to financial and technical setbacks, as well as the Challenger disaster, it wasn't carried into orbit until 1990. Then it was discovered that its main mirror had been ground incorrectly, a miniscule flaw resulting in very blurry images. The instruments to correct this flaw were installed on the HST in 1993.

Many institutions participated in the construction of the HST. In particular, the Marshall Space Flight Center put in charge of the design, development and construction of the HST commissioned the Fairfield County based optics company Perkin-Elmer to design and construct the Optical Telescope Assembly and Fine Guidance Sensors for the HST. Perkin-Elmer began working on the HST main mirror in 1979 and finished polishing it in 1981.

The HST was launched on April 24, 1990, but within weeks it became apparent that its image quality was well below expectations. Analysis of the data revealed that the problem had been caused by the primary mirror's 10-nanometers variation from the prescribed curve. This error was in turn found to have been caused by the custom-built null detector (a testing tool used to give a mirror the required shape) to which Perkin-Elmer had switched for the final phase of the manufacturing process and which turned out to have been assembled incorrectly (one of its lenses was out of position by 1.3 mm). Ironically, conventional null detectors used in the final tests of the mirror before launch indicated a spherical aberration, but Perkin-Elmer disregarded these results, believing the custom-built null detector to be more accurate.

It was decided that the best way to correct the mirror's flaw would be to install two correcting devices during a servicing mission. This was done in December of 1993 and proved successful. In October of 1993 Perkin-Elmer which had owned the Danbury Optical System unit which had produced the flawed mirror agreed to pay \$15 million to avoid a threatened lawsuit from the U.S. government. Hughes Aircraft which had acquired the Danbury unit after the production of the mirror agreed to forego \$10 million in fees it would otherwise have received from NASA.

Scope and Content Note

The HST Manuscript Collection at the Norwalk Public Library is housed in six file boxes. It contains mostly newspaper and magazine articles about the HST published in 1990 and papers and publications by NASA, Perkin-Elmer and Hughes Co. written in the 1980s and 1990.

Box 1 contains articles from general periodicals, such as The New York Times, The Washington Post, Aviation Week & Space Technology and many others in chronological order; general periodicals themselves – magazines such as Astronomy and Sky & Telescope – arranged alphabetically by title and then in chronological order; and several books about the HST listed in chronological order.

Boxes 2-4 contain corporate and NASA publications, such as Dialog published by Perkin-Elmer, HDOS Banner published by Hughes Danbury Optical Systems, Marshall Star published by NASA and many others; corporate monograph publications and unpublished papers about the HST; materials sent to NASA by Perkin-Elmer; testimonies and statements made before the Subcommittee on Science and

Technology at the U.S. House of Representatives in 1984; the HST papers with no imprint; and the HST photographs.

Box 5 contains the papers of Robert Perliss, a senior engineer at Perkin-Elmer, in charge of the System Problem's Group at the Electro-Optical Division, such as his company file and professional correspondence.

Box 6 contains books which are part of this collection, but don't fit in the boxes with the other materials with which they belong thematically; there's a reference to these books there, along with a note regarding their location.

Description of the Collection

Box 1

Articles from General Periodicals, in Chronological Order

Folder 1: 1950s – 1970s

"Sliding Contacts: A Review of Literature" by Frank Spayth, Stanton East, *Electrical Engineering*, Oct. 1953, pp. 912-917.

"Lacrosse – Jupiter – Redstone – Little John," *Missiles and Rockets*, July 28, 1958, pp. 126-129.

"Which Accelerometers for Spacecraft Guidance?" by J. M. Slater, *Aerospace Electronics*, Oct. 1960, pp. 227-228, 230, 232, 234, 238, 240.

"Inertial Sensors" by Norri Sirri, *Space/Aeronautics*, April 1962, pp. 117, 119, 121, 123.

"Aiming a 3-Ton Telescope Hanging From Balloon" by E. R. Schlessinger, *Electronics*, Feb. 8, 1963, 5 p.

"Panoramic Camera Designed for Low-Level Operations" by Roderick D. Hibben, *Aviation Week & Space Technology*, May 9, 1966, pp. 104-105, 107.

"Design Phase of Space Telescope Nears" by Benjamin M. Elson, *Aviation Week & Space Technology*, Aug. 8, 1977, pp. 54-58.

Folder 2: 1980-1984

"Currency Inspected at rates of 192,000 notes/hr" by Gene Coggshall, Perkin-Elmer Corp., *Industrial Research 7 Development*, Nov. 1981, pp. 122-125.

"Space Telescope Holds NASA's Hopes for Grand Discoveries in Universe" by John Noble Wilford of Wilton, CT, *New York Times*, Jan. 5, 1982, C1-C2.

"Simulation Verifies Telescope Servicing" by Craig Covault, *Aviation Week & Space Technology*, May 3, 1982, pp. 47-50, 55.

"Space, Time, and Their Relationships" by William VanDeusen, *Industrial Research & Development*, Sep. 1982, pp. 138-141.

"Problems Spur Shift in Telescope: Space Project Experiencing an Overrun of \$200-250 Million, 12-18-Month Launch Slip, Guidance, Contamination Difficulties" by Craig Covault, *Aviation Week & Space Technology*, April 4, 1983, pp. 14-15.

"Glimpse of Infinity: The Ultimate Telescope Will Take Us to the Edge of the Cosmos" by Mary Jo Boyd, *Science Digest*, July 1983, pp. 70-79, 104.

"Glimpse of Infinity: The Ultimate Telescope Will Take Us to the Edge of the Cosmos" by Mary Jo Boyd, *Science Digest*, July 1983, Vol. 91, No. 7, pp. 70-79, 104, reprinted as a brochure, 2 copies.

Folder 3: 1985-1989

"America's Supersecret Eyes in Space" by James Bamford, *The New York Times Magazine*, Jan. 13, 1985, pp. 39-43.

"Haley's Here! And This Time Around, the Fabled Comet May Provide Answers to Scientific Questions That Have Eluded Us for Centuries" by Benedict A. Leerburger, *Sky*, Nov. 1985, pp. 40-42, 44-45, 47, 49-51.

"Ground Controllers Canceled Mission 61-C Thruster Tests Because of Explosion Danger," *Aviation Week & Space Technology*, March 17, 1986, p. 24.

"NASA Identifies Failure Scenarios" by Edward H. Kolchum, *Aviation Week & Space Technology*, March 17, 1986, p. 25-26.

"The New, Improved Space Telescope" by Richard Tresch Fienberg, *Sky & Telescope*, Feb. 1989, pp. 153-155.

"The Big Glass: The Craftsmen Working on the Hubble Space Telescope were Going for the Smoothest and Brightest Mirror Ever" by Terry Dunkle, *Discover*, special section: Space, the Once and Future Frontier, July 1989, pp. 69-81.

"Perkin-Elmer Prepares to Sell IC Production Equipment Unit: Erosion of U.S. Technology Base" by Brian Santo, *The Institute*, July 1989, p. 8.

"America and the Electronic Future," *The New York Times*, Nov. 28, 1989, A 24.

Folder 4: Jan. – April 1990

“Hubble Space Telescope, Plagued by Problems, May Open the Heavens, But has Cost the Earth” by Bob Davis, *The Wall Street Journal*, April 5, 1990, A20.

“Shuttle Holds Area Scientists’ Hopes: Hundreds have Stake in Long-Delayed Hubble Telescope – Anxiously Awaiting the Launch” by Lisa Leff, *The Washington Post*, April 10, 1990, A1, A9.

“Early Release of Telescope Data Set: NASA to Provide Raw Images Promptly; Countdown Continuing” by Kathy Sawyer, *The Washington Post*, April 10, 1990, A9.

“Hubble Telescope’s ‘Space Legs’ a Bit Stiff on Day 1” by Kathy Sawyer, *The Washington Post*, April 27, 1990, A3.

Folder 5: May – June 1990

“After Hubble: ASA Aims to Decode the Babel of the Cosmos” by John Noble Wilford, *The New York Times*, May 1, 1990, C1, C10.

“NASA is Confident It Can Fix Balky Antenna on Telescope – NASA Says It Can Fix Recalcitrant Antenna” by John Noble Wilford, *The New York Times*, May 1, 1990, A1, C9.

“Hubble Telescope’s Trouble Solved: Snagged Antenna’s Rotation Restricted” by Kathy Sawyer, *The Washington Post*, May 1, 1990, A3.

“Hubble’s First Images of Space: Picture Shows Difference from Ground-Based Telescopes,” *San Francisco Chronicle*, May 21, 1990, A2.

“Defect Ruins Focus of Space Telescope: Astronauts to Try Repairs in 1993 – Defect Ruins Space Telescope’s Focus” by Kathy Sawyer, *The Washington Post*, May 28, 1990, A1, A39.

“Hubble Trouble: Antenna Pair Tied to be Fit – NASA, Lockheed ‘Not Pointing Any Fingers’ After Antenna Scare” by Trudy E. Bell, *The Institute*, June 1990, p. 1, 6.

“Hubble Telescope Loses Large Part of Optical Ability: Most Complex Instrument in Space is Crippled by Flaw in a Mirror – Defect Cripples Space Telescope” by Warren E. Leary, *The New York Times*, June 28, 1990, A1, A20.

“Hubble Flaw Disappoints Those Who Helped Build It” by Eric Lipton, *The Hartford Courant*, June 29, 1990, pp. A1, A7.

“Pentagon Tests Could Have Found Hubble Defects Before Launch, Officials Say” by R. Jeffrey Smith, William Booth, Kathy Sawyer, *The Washington Post*, June 30, 1990, A16.

Folder 6: July 1990

“NASA Looks to Past for Answers: Pre-Challenger Records Checked for Clues to Hubble, Shuttle Flaws” by Kathy Sawyer, *The Washington Post*, July 1, 1990, A21.

“Astronomers Say Telescope’s Blurry Vision Will Affect Most of Its Work” by William Booth, *The Washington Post*, July 1, 1990, A21.

“Hubble Monitors Say They Were Overworked, Overconfident” by William Booth, *The Washington Post*, July 3, 1990, A4.

“BAT Strikes Back” by Russell Baker, *The New York Times*, July 7, 1990.

“Hubble Mirrors Lacked Backup Tests: Optical Experts Say Independent Scrutiny Might Have Found Flaws” by William Booth, *The Washington Post*, July 8, 1990.

“NASA Fights Image, Technical Problems on Hubble, Shuttle” by Craig Covault, *Aviation Week & Space Technology*, July 9, 1990, p.16-18.

“Hubble Telescope’s 1st Shocking Photos Show: UFO Invasion Fleet Heading for Earth,” *Sun*, July 10, 1990.

“NASA Pride Lies Behind Hubble Woes” by Dave Dunleavy, *The News-Times*, July 11, p. 1, 8.

“Big Mirror Seems to be Flawed” by Dave Dunleavy, *The News-Times*, July 11, p. 1, 8.

“Hughes Chief Says Test Needed” by Mark Gruenberg, *The News-Times*, July 11, p. 8.

“Hubble Trouble: Learning from Our Mistakes” by Stanley G. Rosen, *The News-Times*, July 15, 1990.

“New European Telescope Called Equal to Hubble” by Malcolm W. Browne, *The New York Times*, July 20, 1990, A12.

“Anatomy of a Failure: Hubble’s Long Saga Marked by Limits on Resources, Costs – Trouble-Stalked Hubble from the Start; Cost-Cutting Heightened Risk of Failure” by Michael Ollove, Gelareh Asayesh, *The Sun*, July 29, 1990, 1A, 14-16A.

“Ignoring Usual Standard, Mirror-Production Team Gambled on Just One Test – Test Data a Decade Old Probed for Origin of Flaw – Contractor, NASA Disregarded Need for a Cross-Check” by Luther Young, William F. Zorzi Jr., *The Sun*, July 29, 1990, A1, A16-18.

“Sleuths Zero In on Cause of Telescope Flaw: Some Researchers Manage 'Fun' in Studying Hubble – Hubble Sleuths Zero In On Telescope Flaw” by William J. Broad, *The New York Times*, July 31, 1990, C1, C6.

Folder 7: Aug. – Dec. 1990

“Hubble’s Primary Mirror Has the Wrong Shape” by Bertram Schwartzschild, *Physics Today*, Aug., 1990, pp. 17-19.

“Hubble Flaw was Found in ’81: Test Results were Discounted; NASA Officials Say They Weren’t Told” by William Booth, *The Washington Post*, Aug. 6, 1990, p. A3.

“Error Found in Hubble Testing Tool: Device Used to Shape Flawed Main Mirror – Panel Finds Error in Device Used to Shape Hubble’s Primary Mirror” by Luther Young, *The Sun*, Aug. 10, 1990, pp. 1A, 3A.

“Hubble Discovers Star Group: Telescope Performance Encourages Scientists” by Kathy Sawyer, *The Washington Post*, Aug. 14, 1990.

“Space Telescope Probe Focuses on Fuzzy Optics – Prime Focus on Hubble’s Optics” by Trudy E. Bell, *The Institute*, Sept., 1990, Vol. 14, No. 8, p. 1, 11.

“Team Tracks Down Hubble Flaw” by Dave Dunleavy, *The News-Times*, Sept. 13, 1990, pp. 1, 8.

“The Hubble Paper Chase: Documents Show Testing Failed to Uncover Flaw” by Dave Dunleavy, *The News-Times*, Sept. 22, 1990, pp. 1, 9.

“Hubble Warning Signs Ignored” by Dave Dunleavy, *The News-Times*, Sept. 23, 1990, pp. 1, 9.

“Hughes’ Top Executive for Hubble Leaves Firm” by Maura McEnaney, *The News-Times*, Oct. 5, 1990, pp. 1, 8.

“New Photos Frustrating, but Show Scope’s Potential” by Associated Press, *The News-Times*, Oct. 5, 1990, pp. 1, 8.

“Why Hubble is Really a Success Story” by Nigel Henbest, *New Scientist*, Oct. 20, 1990.

“Mission Weighted to Fully Correct Space Telescope’s Blurred Vision” by John Noble Wilford, *The New York Times*, Oct. 27, 1990.

“Hubble Investigation Board Finds Out What Went Wrong” by Bertram Schwartzschild, *Physics Today*, Nov., 1990, pp. 19-21.

“Panel on Space Telescope Cites Flaws in Management” by Warren Leary, *The New York Times*, Nov. 28, 1990.

Folder 8: 1991 – 1992

“More Hubble Trouble: Blind Oversight, NASA Under Scrutiny” by Trudy E. Bell, *The Institute*, Jan., 1991, p. 1, 9.

“Saturn’s Great White Spot Spectacular” by Stephen James O’Meara, *Sky & Telescope*, Feb. 1991, pp. 144-147.

“NASA Awards Contract to Complete ‘Costar,’ Designed to Fix Hubble Telescope Optics,” *Aviation Week & Space Technology*, Oct. 21, 1991, p. 98.

“Hubble Returns Good Data, But Future is Clouded” by Craig Covault, *Aviation Week & Space Technology*, Oct. 28, 1991, pp. 20-22.

“Venus Unveiled: A ‘Stunningly Different Place’ – Magellan Space Probe Maps ‘the Face of a New Planet’” by Paul Hoversten, *USA Today*, Oct. 30, 1991, pp. 1A, 14A.

“Arcane Equations Led Einstein and All of Us Into a Relative World – Einstein’s Arcane Physics Overturned Newton and Threw All of Us Into a Relative World” by Jerry E. Bishop, *The Wall Street Journal*, Dec. 9, 1991, pp. A1, A8.

“Early Results from the Hubble Space Telescope: Although Hampered by Optical and Mechanical Flaws, Hubble has Relayed a Plentitude of Eye-Opening Images and Revealing Spectral Portraits of Cosmic Objects” by Eric J. Chaisson, *Scientific American*, June 1992, pp. 44, 46-51.

Folder 9: 1993 – 1998

“Hughes, Perkin-Elmer to Pay U.S. for Hubble Telescope Flaw” by Ralph Vartabedian, *Los Angeles Times*, Oct. 5, 1993.

“Mission to Correct Hubble’s Flawed Vision Faces Many Pitfalls – Hubble Repair Mission Faces Pitfalls” by John Noble Wilford, *The New York Times*, Nov. 30, 1993, C1, C10.

“Hubble’s New Vision: Improved Images from Repaired Space Telescope Bring a Rush of Astronomical Discoveries” by Kim A. McDonald, *The Chronicle of Higher Education*, June 8, 1994, pp. A7, A12.

“Hubble’s Stellar Performance,” *Sky & Telescope*, July 1994, pp. 12-13.

“Reflections on Hubble’s Repair” by Jeffrey A. Hoffman, *Sky & Telescope*, Feb. 1995, p. 26.

“2 Groups of Scientists Produce Matter That Einstein Postulated – Groups of Physicists in Colorado and Texas Produce a Substance Postulated by Einstein” by Malcolm W. Browne, *The New York Times*, July 14, 1995, pp. A1, A 14.

Folder 10: 1999 – 2002

“Hubble Looks Back” by David J. Eicher, *Astronomy*, Jan. 1999, pp. 42-46.

“Hubble’s 10 Great Discoveries” [by Paul Hoversten], *USA Today*, Nov. 5, 1999, p. 9A.

“Telescope Would Have ‘Blown Away’ Namesake” by Paul Hoversten, *USA Today*, Nov. 5, 1999, p. 10A.

“NASA Races to Launch Hubble Repair Mission” by Paul Hoversten, *USA Today*, Nov. 5, 1999, p. 10A.

“‘Extreme’ Cosmic Images Start Flashing into View: Telescopes Use X-Ray Vision to View Hearts of Galaxies – X-Ray Vision Peers into Hearts of Galaxies” by James Glanz, *The New York Times*, Jan. 11, 2000, pp. F1, F 4.

“Our Eye Into Deep Space: Retirees Reflect on Hubble Trouble and Success – Perkin-Elmer Retirees Reflect on Hubble Trouble and Success” by Lois Street, *Ridgefield Press*, Dec. 28, 2000, p. 1A, 25A.

“Hubble to See Stars in Different Light – NASA Repair Mission Will Let Hubble See Stars in a Different Light” by Warren E. Leary, *The New York Times*, Feb. 19, 2002, pp. F1, F5.

Folder 11: 2003 – 2009

“As Clock Ticks for Hubble, Some Plead for a Reprieve” by Dennis Overbye, *The New York Times*, July 27, 2003, pp. F1, F23.

“John N. Bacall, 70, Dies; Astrophysicist at Princeton” by Dennis Overbye, *The New York Times*, Aug. 19, 2005, p. C14.

“One Last Ride to the Hubble – For the Hubble, a Last Ride and a Final Reprieve” by Dennis Overbye, *The New York Times*, Dec. 4, 2007, pp. F1, F4.

“Has Hubble been Worthwhile?” by Michael Savage, *Pretoria News*, Dec. 5, 2007.

“Hubble Upgrade Mission on Hold,” by Irene Klotz, *Pretoria News*, Jan. 9, 2008.

“Remembering When U.S. Finally (and Really) Joined the Space Race” by John Noble Wilford, *The New York Times*, Jan. 29, 2008, p. F3.

“Astronauts Fight for Hubble Mission and Win: Trip to Repair the Aging Telescope Scheduled to Begin in August” by Sam Champion, Rich McHugh, Johann Brady, *ABC News*, Feb. 9, 2008.

“Inside Story of the Telescope That Nearly Wasn’t Built” by Dennis Overbye, *The New York Times*, Aug. 5, 2008, p. F2.

“Last Voyage for the Keeper of the Hubble – Keeper of the Hubble Prepares for the Last Tuneup” by John Grunsfeld, *The New York Times*, April 14, 2009, pp. D1, D4.

“TRW Selected to Lead Development of NASA’s Advanced X-Ray Satellite” by Michael A. Dorheim, no publisher, no date.

“Hubble Space Telescope Focuses on Mira Variables,” no author, no publisher, no date.

“Space Technology: NASA/Rockwell Space Shuttle on Pad 39A,” 1 page with an illustration, no publisher, no date.

General Periodicals, Alphabetically by Title, Then in Chronological Order

Astronomy, Jan. 1986, 2 copies.

Astronomy, Nov. 2004.

Astronomy, July 2007.

Astronomy, Sep. 2007.

Astronomy, Oct. 2007.

Astronomy, Dec. 2007.

Astronomy, collector's ed., 2007.

Astronomy, Oct. 2008.

Challenge magazine, no date.

Science News, Jan. 6, 1990.

Sky, March 1938.

Sky & Telescope, April, 1985.

Sky & Telescope, May 1985, 2 copies.

Sky & Telescope, Nov. 1993.

Sky & Telescope, April, 1994.

Space Journal, March-May 1959.

Books, in Chronological Order

The National Air and Space Museum, Volume Two: Space from Earth to the Stars by C. D. B. Bryan, published by Peacock Press/Bantam Books in Toronto, New York, etc., in 1982 (2nd rev. ed.), 160 p.

The Space Telescope by David Ghitelman, published by Gallery Books, imprint of W. H. Smith Publishers, Inc., 1987, 143 p. (in box 6)

The Hubble Wars: Astrophysics Meets Astropolitics in the Two-Billion –Dollar Struggle Over the Hubble Space Telescope by Eric J. Chaisson, Harper Collins Publishers, 1st ed., 1994, xi, 386 p., [8] p. of color plates. (in box 6)

Box 2

Perkin-Elmer Corp. Publications, in Chronological Order

Optics Plus: Merging Electronics and Mechanics with Optics, published by the Perkin-Elmer Corp. in Norwalk, CT in 1953, 59 p. (in box 6)

"Principles of Optics: An Introduction to Precision Optical Design and Fabrication, with Emphasis on Modern Reconnaissance, a Series of Talks Presented by Personnel of the Perkin-Elmer Corporation at Wright-Patterson Air Force Base, Dayton, Ohio, Jan. 10-11, 1962."

"Special Presentation on the Principles of Optics Prepared for Bureau of Engraving and Printing," Oct. 1977.

Folder 1: Dialog Published by Perkin-Elmer, Norwalk, CT

Dialog, vol. 4, no. 2, May 1981, copy of Robert Perliss.

Dialog, vol. 4, no. 4, Nov. 1981, copy of Robert Perliss.

Dialog, vol. 5, no. 2, April 1982, copy of Robert Perliss.

Dialog, vol. 5, no. 3, June 1982, copy of Robert Perliss.

Dialog, vol. 5, no. 4, Sep. 1982, copy of Robert Perliss.

Dialog, vol. 6, no. 1, Jan. 1983, copy of Robert Perliss.

Folder 2: EOTD Newsletter Published by Perkin-Elmer, Electro-Optics Technology Division

EOTD Newsletter, Nov. 1988, 4 p.

EOTD Newsletter, March 1989, 4 p.

EOTD Newsletter, Sep. 1989, 4 p.

EOTD Newsletter, Oct. 1989, 2 p.

Folder 3: Optical Group Infocus Published by Perkin-Elmer

"Special Edition: Optical Group's Technical 'Heart and Soul' Honored," *Optical Group Infocus*, Oct. 1984, vol. 1, no. 5.

"Perkin-Elmer Celebrates OTA Completion," *Optical Group Infocus*, Nov. 1984, vol. 1, no.6.

"Casper [Cost and Schedule Performance Evaluation Review] Settles in Wooster Heights" by Ray Jung, *Optical Group Infocus*, Jan. 1985, vol. 1, no. 7.

"Banking on SOD [Systems Operations Division]" by Kathy Ronan, *Optical Group Infocus*, March 1985, vol. 2, no. 2, pp., 1, 8.

"Mac Cramer: A Man Who Leaves His Mark," *Optical Group Infocus*, April 1985, vol. 2, no. 4, pp. 1-2.

“Wooster Heights Tests New Food Service” by Kathy Ronan, *Optical Group Infocus*, May 1985, vol. 2, no. 5, pp. 1, 3.

“1,000 Employee Moves Scheduled for June and July” by Kathy Ronan, *Optical Group Infocus*, May 1985, vol. 2, no. 5, pp. 1, 3, 4.

“All Flight FGSs Accepted by NASA,” *Optical Group Infocus* published by Perkin-Elmer, Nov. 1985, vol. 2, no. 10, p. 6.

“SOD: A High Tech Resource,” *Optical Group Infocus*, Nov. 1985, vol. 2, no. 10, p. 8.

“Leadership and Insight: John Rich, Group Vice-President and General Manager of SOD” by Carol Zahn, *Optical Group Infocus*, March 1986, vol. 3, no. 2 p. 1, 2.

“P-E Proposing to Build Solar Concentrators of Epic Proportions,” *Optical Group Infocus*, March 1986, vol. 3, no. 2 p. 5, 6.

“The Catalysts of Technology: Peter Mumola, Director of Optical Group Research, Recently Named Vice President” by Carol Zahn, *Optical Group Infocus*, May 1986, vol. 3, no. 3 p. 1, 11.

Folder 4: Pen Published by Perkin-Elmer for the Company’s Employees

Pen, July 1965, vol. 13, no. 5.

Pen, Oct. 1987.

Folder 5: Retire Club News Published by an Organization of Perkin-Elmer Retirees and Former Employees, Norwalk, CT

Retire Club News, Special Newsletter # 35, Feb. 2000.

Retire Club News, Special Newsletter # 51, Dec. 2003.

Retiree Club News, March 2007.

Retiree Club News, Sept., 2007.

Retiree Club News, Dec. 2007.

Retiree Club News, June 2008.

Retiree Club News, Sep. 2008.

Retiree Club News, Dec. 2008.

Retiree Club News, March 2009.

Folder 6: ST Highlights Published by Perkin-Elmer, Optical Group, Danbury, CT

ST Highlights, Jan. 1984, vol. 2, no. 1.

ST Highlights, April 1984, vol. 2, no. 5.

ST Highlights, April 1984, vol. 2, no. 6.

ST Highlights, July 1984, vol. 2, no. 9.

ST Highlights, Aug. 1985, vol. 3, no. 5, 3 copies.

Folders 7 & 8: Technical News, Optical Group Published by Perkin-Elmer, Danbury, CT

Technical News, Optical Group, Nov.-Dec. 1972, vol. 2, no. 2, 2 copies.

Technical News, Optical Group, March-April 1973, vol. 2, no. 4.

Technical News, Optical Group, June 1974, vol. 3, no. 3.

Technical News, Optical Group, Jan. 1975, vol. 4, no. 1.

Technical News, Optical Group, June 1975, vol. 4, no. 2.

Technical News, Optical Group, Nov. 1975, vol. 4, no. 3.

Technical News, Optical Group, July 1976, vol. 5, no. 1.

Technical News, Optical Group, Sep. 1977, vol. 6, no. 1, on large mirror development.

Technical News, Optical Group, Sept. 1981, vol. 9, no. 1.

Technical News, June 1982, vol.10, no. 1, on semiconductor technology (in folder 8).

Technical News, Oct. 1982, vol.11, no. 2, on astronomical perspectives, 2 copies (in folder 8).

Folder 9: Update Published by Perkin-Elmer

"Products Featured in Workshops for Norwalk Teachers," *Update*, April 30, 1986, p. 1, 3.

"High-Tech Mailman Makes Norwalk Deliveries Special" by Ann Marie Minton, *Update*, July/Aug., 1986, p. 4.

"TMA Modification Contract Awarded to OG" by Carol Zahn, *Update*, Jan./Feb., 1987, p. 3, 5.

Folders 10-13: Materials Sent to NASA by Perkin-Elmer

Folder 10

Letter from L. H. Fagan, Contract Supervisor at Perkin-Elmer to C. C. Mitchell at NASA, Sept. 11, 1984, that accompanied the documentation on the Optical Telescope Assembly (OTA).

“Dealing With Potential Thermal Anomalies During OV,” 2 p.

“OTA Daily Thermal Summary,” 1 p.

“OTA Daily Thermal Anomaly Report,” 1 p.

“OTA Hourly Thermal Sensor Verification,” 4 p.

“Altitude Pressure Temp,” 3 p.

“Assessment of Contract End Item” which certified that “all applicable drawings and specifications have been complied with by the seller, with the exception of those itemized in the waiver below” signed by Robert Perliss on behalf of the seller (Perkin-Elmer).

“Certificate of Flight Worthiness” signed by the representatives of the seller (Perkin-Elmer) on Sept. 12, 1984, 2 copies.

“Space Telescope Project Major Meetings and Activities,” weekly schedule for Oct. 1984, 2 copies.

“Space Telescope Certificate of Configuration Compliance” signed by the representatives of Perkin-Elmer in Oct., 1984.

Material Inspection and Receiving Reports for:

Oct. 9, 1984, 2 p.

Oct. 23, 1984, 4 p.

Aug. 1, 1985, 3 p., 2 copies, Sept. 4, 1985, 3 p., 2 copies, with accompanying letter from J. Schneider, Principal Contract Administrator at Perkin-Elmer, to R. T. Woodman at NASA, Oct. 14, 1985.

Oct. 1, 1985, 3 copies, with “OTA Correspondence” summary sheet and accompanying letter from J. Schneider, Principal Contract Administrator at Perkin-Elmer, to M. E. Rosenthal at NASA, Oct. 3, 1985.

Folder 11

Nov. 11, 1985

May 21, 1986, 3 p.

April 2, 1987, 2 p.

Jan. 18, 1989, 2 p.

“OTA Thermal Control System,” 5 p.

“HST, Capabilities/Uses, Recommended Disposition After Launch,” 15 p.

A series of 14 pages of design drawings of mirrors and thermistors.

Folder 12

Letter from Roy Stoll to R. Brown with an "update of red and yellow temperature limits," July 11, 1989, 2 p., with "Appendix A: OTA Thermal Sensors" data, 7 p.

"OTA Menu," 9 p.

"HST Orbital Verification, Part 1 Integrated Timeline," 10 p.

"Deployment Mission," 8 p.

Folder 13

"OVIS Sequences 1-60, Initial Deployment Through Aperture Door Open," 3 p.

"HST Mission Schedule of Events," 16 p.

Glossary, 12 p.

"Orbital Verification Operations: Tools Review" by J. Landner, Dec. 14, 1989.

Box 3

Folders 1-7: Miscellaneous Materials Created by Perkin-Elmer, in Chronological Order

Folder 1

"Automatic Azimuth Alignment Equipment and Missile Range Instrumentation," 1958, 12 p.

"Operation, Service and Repair for Long Range Azimuth Alignment Theodolite, Model 523-0005," 1958.

"Operation, Service and Repair for Short Range Azimuth Alignment Theodolite Electronic Panel, Model 169-0190, Long Range Azimuth Alignment Theodolite Electronic Panel, Model 523-0051" 1958.

'Operation, Service and Repair for Short Range Azimuth Alignment Theodolite, Model 169-0170," 1958.

Folder 2

"New Developments for Aerial Photography: a Program of Talks Presented by the Personnel of the Perkin-Elmer Corp. to Members of OSA, ASP, SPIE, SPSE at a Joint Meeting Held on Sep. 16, 1964 in Wilton, Conn.," iv, 11, 19, 8, 11, 7 p.

Perkin-Elmer stock report issued on Oct. 5, 1966.

Perkin-Elmer stock report issued on Oct. 7, 1971.

Folder 3

Perkin-Elmer, Annual Report for 1978, 32 p.

«Optical Fabrication and Test” by L. Montagnino, R. Arnold, D. Chadwick, L. Grey, G. Rogers from the Perkin-Elmer Corp., *Space Optics*, vol. 183, May 22-24, 1979, pp. 109-113.

“NASA Space Telescope -- Space Telescope Press Information” published by Perkin-Elmer on Dec. 28, 1979.

Folder 4

“Space Telescope Optical Assembly” by Daniel J. McCarthy, Perkin-Elmer Corp., 1980, *IEEE*, pp. 486-490.

“Employee Bulletin: Organizational Announcement,” Feb. 13, 1981, 3 p.

Heights News, Vol. 14, No. 4, Oct. 1981.

“Space Telescope: Press Information” by Perkin-Elmer, Spring 1982, ii, 17 p.

Space Science Division Optical Group Corporate Flowchart, May, 25, 1983.

“OTA Functional Mechanization Diagram,” Nov. 3, 1983.

“FGS Assembly,” Dec. 13, 1983, 6 p.

Folder 5

“NASA Hubble Space Telescope” published by Perkin-Elmer, 1985, Danbury, CT, 6 p., 2 copies.

“Perkin-Elmer... Where Excellence in Technology is a Tradition,” advertisement in *The New York Times*, March 17, 1985, 32F.

“SOD Highlights,” August 1985, vol. 2, no. 8, published by Perkin-Elmer, Systems Operations Division, 2 p.

7 color photographs from Perkin-Elmer lab dated Aug. 13, 1985.

1 color photograph from Perkin-Elmer lab dated Aug. 15, 1985.

“The development of space instrumentation,” an informational color sheet published by Perkin-Elmer, 1986.

“SOF: A Summer of Progress” by Carol Zahn, *OG Regional News* published by Perkin-Elmer, August 1986, p. 1.

“OTA Component and Heater Power,” Sept. 18, 1986.

Color photograph taken in Perkin-Elmer on April 10, 1987.

Folder 6

"You and Perkin Elmer," Aug. 1989 (in box 2)

"Correction of Misalignment Dependent Aberrations of the Hubble Space Telescope via Phase Retrieval" by Louis D. Grey, Systems Operations Division, and Richard G. Lyon, Space Science Programs, delivered at the SPIE conference on Aug. 10, 1989.

"Space Telescope Optical Control Familiarization" by R. Basedow, Oct. 18, 1989, Perkin Elmer, pp. 79-114.

Folder 7

"Status of the Flight Hardware and Ground System for Hubble Space Telescope Astrometry" by L. Abramowicz-Reed, Perkin Elmer Corp., A. Bradley, Allied Signal Aerospace Corp., D. Story, G. Benedict and W. Jeffreys, McDonald Observatory and Univ. of Texas, Austin, Jan. 9-13, 1990.

"OVMT Record OTA Mission Log," April 10, 1990 – June 18, 1990, Room 141, 6 p.

"Decoding Perkin-Elmer 1998 Annual Report" (in box, without folder)

"What Will We Know? PE Corporation 1999 Annual Report" (in box, without folder)

Folders 8-15: Undated Materials Created by Perkin-Elmer

Folder 8

"Building the Optical Telescope: Assembly for the HST and Hubble Heritage Picture Album," a DVD disc.

"Christmas List Project Brownie," typed manuscript, 3p.

"Hubble Space Telescope Fact Sheet" by Perkin-Elmer, 4 copies.

"Grandest Scientific Undertaking of Our Time," Perkin-Elmer, no date.

Folder 9

"IRAS – Infra-Red Astronomical Satellite" by Perkin-Elmer's Optical Group, 2 p.

"KS-68 A and KS-69 A Panoramic Camera Systems" by Perkin-Elmer's Electro-Optical Division, 4 p.

"Lens Mounting Techniques" by P. R. Yoder, Jr., the Perkin-Elmer Corp., Norwalk, CT, 11 p.

"Mini-Plan D Flight Test Imagery" by Perkin-Elmer, 2 p.

"NASA Space Telescope" published by Perkin-Elmer, 4 p., 14x8 cm.

“Optical Group” published by Perkin-Elmer, Danbury, CT, no date, 5 folded pages with color photos about the HST assembly and testing, 2 copies.

“Optical Group” published by Perkin-Elmer, Wilton, CT, no date, 6 p.

Folder 10

“Perkin-Elmer: Responsive Technology” published by Perkin-Elmer, 20 p.

Perkin-Elmer Corp. CEO flowchart

Perkin-Elmer Corporation, Norwalk, CT, no date, 32 p.

“Reconnaissance Sensors and Instrumentation” published by Perkin-Elmer, Norwalk, CT, 14 p. A black-and-white photograph illustrating typical aerial photography imagery is enclosed.

Folder 11

“Solid State Aspect Sensor” by L. Cassidy and L. Kaplan, the Perkin-Elmer Corp., Optical Technology Division, Danbury, CT, 10 p.

“Space Telescope Assembly,” a colorful information sheet by Perkin-Elmer, 4 copies.

“Space-Optics System” published by Perkin-Elmer, Electro-Optics Division, Norwalk, CT, 17 p.

Folder 12

“Special Optics Facility: Optical Technology Center” by Perkin-Elmer, 4p.

“System Command Equipment Rack (SCCER)” published by Perkin-Elmer, 3 p., 2 copies.

“Thank you, Vendors and Subcontractors! Perkin-Elmer Completes Optical Space Telescope Assembly” by Perkin-Elmer, 4p., 2 copies.

Artist’s Concept of NASA/Perkin-Elmer’s Solar Optical Telescope Observatory

Artist’s Concept of the Space Telescope

Black-and-white photograph of Dr. Martin Yellin, Perkin-Elmer Fabrication Manager, checking the cutting action of the cup wheel on the front surface of the Space Telescope primary mirror.

Folder 13

“Overview of the FGS Optics.”

“FGE Modes”

Folder 14

“Null Mirror Spacing Measurement.’

“Fine Guidance Sensor.”

Folder 15

2 untitled groups of notes and designs.

Folder 16: Materials Assumed to Be by Perkin-Elmer

“Motivation Theory,” 3 typed pages, apparently an outline for a presentation

“Theory of Attitudes,” 1 typed page, apparently an outline for a presentation

“The Hay Guide Chart for Evaluating Know-How” by Edward N. Hay & Associates, ©1964

Box 4

Hughes Co. Publications

Folder 1: HDOS Banner Published by the Hughes Danbury Optical Systems

“The Launch at Last,” *HDOS Banner*, Vol. 1, No. 1, May 1990.

HDOS Banner, Vol. 1, No. 2, June 1990 – sp. ed. dedicated exclusively to the launch of the Hubble Telescope (2 copies).

“AXAF Hits Major Milestones,” *HDOS Banner*, Vol. 1, No. 5, Oct. 1990, pp. 1-3.

“Space Shuttle to head for HST... Key HDOS Payload Aboard” by Rob McIntire, *HDOS Banner*, Vol. 7, No. 8, Oct. 1996.

Folder 2: Hughes News

Hughes News, vol. 49, no. 21, Oct. 20, 1989.

“Hubble to Take Man Beyond His Stars: Astronomers Look to Telescope for Facts From the Beginning of Time,” *Hughes News*, April 6, 1990, pp. 4-5.

“Danbury Exec Speaks Before Hubble Panel – Danbury Exec Testifies”, *Hughes News*, vol. 50, no. 13, July 13, 1990, p. 1, p.6.

Folders 3-5: Miscellaneous Materials Created by Hughes, in Chronological Order

Folder 3

“Fine Guidance Sensor Turns in Stellar Performance for NASA Telescope,” *Hughes Electronic Herald*, Sept. 22, 1985, p. 4.

Vectors, vol. XXXI, Number 4, 1989, published by Hughes, subsidiary of GM Hughes Electronics; includes "Gathering Heavenly Light" (pp. 10-21).

Inside EDSG, Vol. 11, no. 9, Nov. 1989.

Announcement to all HDOS employees by Hughes Danbury Optical Systems president John C. Rich that "Hubble Space Telescope is experiencing problems. We are hard at work helping NASA to determine exactly what the problem is, its source and a means for its solution," dated July 2, 1990.

Announcement to all HDOS employees by Hughes Danbury Optical Systems president John C. Rich that "NASA is currently conducting an investigation into the circumstances surrounding the design, manufacture and construction of the Hubble Space Telescope," dated July 16, 1990.

Folder 4

"Summary of Technique originally Employed (1980-81) for Alignment of Reflective Null Lens" by M. Harris, Aug. 15, 1990.

"Update; Hubble Space Telescope's First 125 Days," Oct. 4, 1990, 5 typed pages, 2 copies.

"Hubble Telescope Discovers Moons Outside Saturn's Outermost Ring," *Hughes Electronics Herald*, Aug. 25, 1995, p. 3.

"HDOS Optics Help Hubble Stay Focused, with an Eye Towards Success," *Hughes Electronics Herald*, Sept. 6, 1998, p. 5.

Folder 5

9 color photographs and one color negative taken in 1990.

Folder 6: Undated Materials created by Hughes

"Hubble Space Telescope Optical Telescope Assembly and Fine Guidance System News Reference Guide" prepared by Hughes Danbury Optical Systems, Inc (26 p.).

"A New Beginning" published by Hughes, Danbury, CT, 10 p.

Folder 7: Marshall Star published by the George C. Marshall Space Flight Center, Alabama

Marshall Star, vol. 24, no. 12, Nov. 23, 1983.

Marshall Star, vol. 24, no. 29, March 28, 1984.

Marshall Star, vol. 24, no. 30, April 4, 1984.

Marshall Star, vol. 24, no. 35, May 9, 1984.

Marshall Star, vol. 24, no. 42, June 27, 1984.

Marshall Star, vol. 24, no. 43, July 5, 1984, 2 copies.

Marshall Star, vol. 24, no. 44, July 11, 1984.

Marshall Star, vol. 25, no. 1, Sep. 12, 1984.

Marshall Star, vol. 26, no. 21, Feb. 5, 1986.

Marshall Star, vol. 26, no. 25, March 5, 1986.

Marshall Star, vol. 30, no. 34, May 2, 1990, 2 copies.

Folders 8-12: Miscellaneous Materials Created by NASA, in Chronological Order

Folder 8

“Space Photography” by John R. Brinkmann from NASA’s Manned Spacecraft Center, *Space/Aeronautics*, Feb. 1966, pp. 72-81.

Letter from James B. Odom, NASA’s Marshall Space Flight Center in Alabama to many addressees, including Mr. D. Fordyce at Perkin-Elmer about the naming of the space telescope, dated Nov., 15, 1983.

NASA Activities published by NASA Administration, June 1984, vol. 15, no. 6, which includes the article “Fine Guidance Sensors Tested.”

“HST: Level I Requirements for the Operations Phase of the HST Program” by the Office of Space Science and Applications, May 17, 1989, 9 p.

Folder 9

“HST FRR Pointing Control System” by G. Nurre, Structures and Dynamics Laboratory at the Marshall Space Flight Center, Sept. 1989, 15 p.

Letter from M. M. Harrington, HST Operations Office at the Marshall Space Flight Center to “distribution” on the subject of “GSFC-Area Accommodations for HST Launch and Orbital Verification period” with 18 p. of handwritten notes attached, Feb. 16, 1990.

Folder 10

“HST Fine Guidance System Data: a Brief Description, Draft” by Charles D. Wende, NASA/GSFC, July, 1990, 27 p.

Goddard News, Vol. 36, No. 7, July 1990, published by Goddard Space Flight Center, NASA.

Letter from David J. Pine, Deputy Manager for Hubble Space Telescope at NASA to Program Manager for Hubble Space Telescope on the subject of "maximizing HST orbital verification progress" dated July 18, 1990.

"HST and Ground Based telescope Photo" by the Office of Public Affairs at the Goddard Space Flight Center, Aug. 13, 1990.

"HST Studies Massive Star in Neighboring Galaxy," Jan. 16, 1991.

Folder 11

1991 NASA Group Achievement Award given on March 26, 1991 to the HST Missions Operations Team and signed by John M. Klineberg, Director of GSFS, including a letter from Fred S. Wojtalik, Manager of the MSFC Observatory Projects Office to GSFC friends that on April 24, 1990 a new chapter in the history of astronomy had been ushered in with the launch of the HST, and the recipients had been part of it.

"STS-31R Payload Handbook" produced by NASA's John F. Kennedy Space Center, 18 13x8 p.

"Designing an Observatory for Maintenance in Orbit: the Hubble Space Telescope Experience" published by NASA, 27p.

Published photo of the crew of Space Shuttle Mission STS-31: Shriver, Bolden, Hawley, McCandless, Sullivan, 2 copies.

NASA stickers

"NASA's Pluto-Kuiper Belt Mission" bookmark.

"Space Telescope" published by NASA, 64 p., copy of Robert Perliss. (in box)

Folders 12-16: HST Materials Created by Other Sources, in Chronological Order

Folder 12

"EASEP Press Backgrounder: Early Apollo Scientific Experiments Package" by Daniel H. Schultz, Director of Public Relations of the Bendix Corp., April 1969, 22 p.

"Understanding of A/D and D/A Converters" by Daniel H. Sheingold, Richard A. Ferrero, from Analog Devices, Inc., *IEEE Spectrum*, Sep. 1972, pp. 47-54.

Folder 13

"Space Shuttle Missions of the '80s," created for the 21st annual meeting of the American Astronomical Society co-sponsored by Rocky Mountain Institute of Aeronautics and Astronautics, Institute of Electrical and Electronics Engineers, and the Operations Research Society of America, in Denver, CO, August 26-28, 1975, 16 p.

"Hubble Space Telescope Handbook for Amateur Astronomers" by Space Telescope Science Institute, October 1986, 20p., printed by Perkin-Elmer.

Folder 14

"Lightweight Mirror Structures Best Core Shapes: A Reversal of Historical Belief" by Simon C. F. Sheng, *Applied Optics*, vol. 27, no. 2, Jan. 15, 1988, pp. 354-359.

"Status of the Flight Hardware and Ground System for Hubble Space Telescope Astrometry" by L. Abramowicz-Reed, Perkin-Elmer Corp.; A. Bradley, Allied Signal Aerospace Corp., Bendix Guidance Systems Division; D. Story, G. Benedict, W. Jefferys, McDonald Observatory and Univ. of Texas, Austin; presented at the Astrometry Poster Session at the 175th meeting of the American Astronomical Society in Washington, DC, Jan. 9-13, 1990, 26 p.

"HST: Analysis of the sensitivity of HST Performance to Errors in the Reflecting Null Corrector" prepared by William B. Wetherell, Mark Kahan, Optical Research Associates, Oct. 10, 1990. (in box)

Folder 15

"Astrographics Product Catalog 2003" published by astrographics.com, 15 p., copy of Robert Perliss.

IEEE Spectrum, Feb. 2008.

"Reconnaissance and Surveillance Photography" by Jerome S. Goldhammer, *Journal of the SMPTE*, Vol. 73, pp. 858-862.

"The Rocket City and Guided Missile Center," an informational sheet published by the Chamber of Commerce of Huntsville, Alabama.

Folder 16

"Hubble Space Telescope: A Cosmic Time Machine" published by Lockheed Missiles & Space Co., 17 p.

"Hubble Space Telescope Fact Sheet" published by the Space Telescope Science Institute, 6p.

"Captions for HST 'Greatest Hits' Slide Set" published by the Space Telescope Science Institute, 7p., 2 copies.

"Digital Sampling and Recovery of Analog Signals" by Bernard M. Gordon, president of Analogic Corp.

Folders 17-: HST Materials Without Imprint

Folder 17

"Space Telescope Configuration," 10 p. of drawings, Jan. 23, 1984.

"Focal Plane Structure Assembly" in 2 parts, "Optical Telescope Assembly," May 31, 1985.

Folder 18

Mission chart, edition 2, Oct. 1989.

HST Program Status Report, July 3, 1990.

HST Program Status Report, July 27, 1990.

2 pages with images of Saturn and its moons, Aug. 26, 1990.

Vol. 1: Executive Summary," Jan. 24, 1991, 3 p.

Folder 19

A modern scientific take on "The Night Before Christmas," 1 typed page.

Snippet from a newspaper mentioning two books on HST: *Hubble Universe: A Portrait of Our Cosmos* by Simon Goodwin, Penguin Studio, 127 p., and *Hubble: A New Window to the Universe* by Daniel Fischer and Hilmar Duerbeck, Copernicus, 175 p.

A page with the design of the Hubble Telescope.

A page with pencil-drawn lenses.

SIS-31, Discovery OV-103 – a sheet, containing a description of the Hubble Telescope and chronology of its first 6 days of work.

5 sheets with star images in pixels.

Design of a rocket, 1 p.

Letter without address, titled "NASA INFO" by a person named "BOB" who had worked for companies which had had NASA contracts.

Folder 20: Proceedings of the Subcommittee on Space Science and Applications of the Committee on Science and Technology at the U.S. House of Representatives

"Statement to Subcommittee on Space Science and Applications of the Committee on Science and Technology at the House of Representatives" by Lyman Spitzer, Jr., Chairman of AURA's Space Telescope Institute Council, and Charles A. Young, professor of Astronomy at Princeton University, on May 22, 1984, 5 p.

"Testimony of Dr. George Field to the Subcommittee on Space Science and Applications of the Committee on Science and Technology at the House of Representatives" on May 22, 1984, 5 p.

“Statement of Robert C. Bless, Chairman of the Space Telescope Observatory Performance Assessment Team before the Subcommittee on Space Science and Applications of the Committee on Science and Technology at the House of Representatives” on May 22, 1984, 4 p.

“Statement of Dr. William R. Lucas, Director of the Marshall Space Flight Center of NASA for the Subcommittee on Space Science and Applications of the Committee on Science and Technology at the House of Representatives” on May 24, 1984, 10 p.

List of witnesses who attended these hearings.

E-mail from Dimitri Mihalas at the Dept. of Astronomy at the University of Illinois who testified before Congress about Hubble’s problem that he had discovered, dated June 28, 1990, to various correspondents at the University of California, University of Illinois, NASA, University of Chicago, and Ohio State University. It was later forwarded to other academics from the above universities, as well as the University of Arizona and the University of Toronto.

Folder 21: Analog Devices

Analog Devices: Applications Manual for Models 201, 202, 203 7 210, [12] p.

Analog Devices: Model 180A/B Low Drift, [4] p.

Analog Devices: An Operational Amplifier Application Manual, parts I-IV, [14, 9, 9] p., reprinted from Sept. 1965, Nov. 1965 and Feb. 1966 issues of *Electromechanical Design*

Folder 22: Electro-Technology , Science and Engineering Series

“Essentials of Thermodynamics” by Robert P. Benedict, from Westinghouse Electric Corp., *Science and Engineering Series # 43, Electro-Technology*, June 1962, pp. 107-122.

“Ordinary Differential Equations” by Allan D. Kraus, from Sperry Gyroscope Co., *Science and Engineering Series # 48, Electro-Technology*, Dec. 1962, pp. 109-126.

“Graphic Analysis of Transfer Functions” by P. R. Amlinger, from Westinghouse Research Center, *Science and Engineering Series # 49, Electro-Technology*, Jan. 1963, pp. 71-90.

“Fundamentals of Measurement” by A. G. McNish, from the National Bureau of Standards, *Science and Engineering Series # 53, Electro-Technology*, May 1963, pp. 113-128.

“Principles of Optics” by Thomas C. Hutchison, *Science & Engineering Series 54: Electro-Technology*, June 1963, pp. 83-102.

“Temperature and Its Measurement” by Robert P. Benedict, *Science & Engineering Series 55: Electro-Technology*, July 1963, pp. 71-86.

“Introduction to Filters” by A. I. Zverev, from Westinghouse Electric Corp., *Science and Engineering Series # 66, Electro-Technology*, June 1964, pp. 61-90.

Folder 23

Norwalk Museum Record of Receipt for Donation to the Norwalk Museum for a list of articles regarding HST’s initial failure, dated Jan. 27, 2008.

Box 5: Robert Perliss’s Papers

Folder 1: 1950s

“Inertial Guidance” by Walter Wrigley, Roger B. Woodbury, John Hovorka of MIT, presented at the annual meeting of the Institute of the Aeronautical Sciences on Jan. 31, 1957, and revised for publication as a Sherman M. Fairchild Fund paper, vii, 69 p., copy of Robert Perliss.

“Equivalent Circuits for the Experimental Study of Instrumentation Problems” by C. K. Stedman, *Statham Instrument Notes* 35, Aug. 1959, copy of Robert Perliss.

“Watts Microptic Auto-Collimator: Instructions for Use” published by Hilger and Watts Ltd., London, in Nov., 1954, 16 p., copy of Robert Perliss.

Folder 2: 1960s

Position Description for a senior engineer at Perkin Elmer, 2 typed pages

Telegram from Russell H. Byles, Employee Manager at Perkin-Elmer to Robert Perliss, offering him a job as Senior Electronic Engineer at the Reconnaissance Branch, Oct. 3, 1961.

Letter from Russell H. Byles, Employee Manager at Perkin-Elmer to Robert Perliss, offering him a job as Senior Electronic Engineer at the Reconnaissance Branch of the Electro-Optical Division, Oct. 5, 1961, 2 p.

Employment Agreement signed by Robert Perliss on Oct. 23, 1961.

Memo to Robert Perliss from the Industrial Relations Dept., asking him to sign the enclosed Salary Release statement, April 19, 1962.

Letter from J. F. Doyle to B. Todd on the subject of task numbers to be used on KS-69 production program (part of SPO 21036) and on SPO 20619, dated Sep. 25, 1963, 3 photocopied typed pages with handwritten notes by Robert Perliss, which includes an authorization list for task numbers.

Letter from J. F. Doyle to KS-69 Program Personnel on the subject of the reassignment of J. F. Coughlin (to be Project Engineer on SPO 26357), while Robert Perliss was to take over Coughlin’s duties as the leader of the System Problem’s Group, dated April 15, 1964, 1 photocopied typed page.

Letter from T. F. Wardle, Works Manager at the Aeroflex Laboratories Inc. to Melvin L. Jackson at the Perkin-Elmer Corp., commending Perliss for “assisting in the engineering and design work necessary to effect the erection cut-off re-erect changes to the 3” and 18” camera mount systems that have been incorporated in the units under L.C. 1051,” May 15, 1964.

Letter from H. F. O’Reilly to “Distribution” on the subject of the instruction of naval personnel on March 8-19, 1965, with two enclosures: agenda for subject instruction and copy of the naval panoramic camera shop maintenance course outline, 7 photocopied typed pages, copy of Robert Perliss.

Letter from M. F. Maguire, Manager of the Ad Hoc Program, to Robert Perliss, thanking him for his contribution to the proposal effort, July 19, 1966.

Letter from R. G. Williamson to Robert Perliss on the subject of the reassignment to Wooster Heights in Danbury where a new corporate building had been built, dated Jan. 17, 1968.

Memorandum from K. W. Patrick to Robert Perliss on the subject of the reassignment to Wooster Heights, dated Feb. 7, 1968.

“Information Guide to Wooster Heights Plant” by Perkin-Elmer, 12 p.

“Organization Charts and Personnel Listings of Departments under the Responsibility of H. W. Robertson, Assistant General Manager,” April 17, 1968, 9 p., copy of Robert Perliss.

Folder 3: Robert Perliss’s Welcome File

A booklet about the group insurance plan for salaried employees at Perkin-Elmer.

A booklet about deferred profit sharing for salaried employees at Perkin-Elmer.

An informational sheet from the Perkin-Elmer Corp.’s Employees’ Activities Association, 1960-1961.

An 8-page welcome letter for the employees of Perkin-Elmer, explaining the company’s policies .

Folder 4: Gyros

“Gyros: a Handbook on Floated Integrating” published by Reeves Instrument Corp. in Nov., 1958, 45 p., copy of Robert Perliss.

“Gyros: Technical Information for the Engineer” prepared by Bernard Lichtenstein, 4th ed., published by Kearfott Division of General Precision, Little Falls, NJ in June, 1961, 60 p., copy of Robert Perliss.

Folder 5: Giannini Technical Notes

“AC Servo Design – Part II” by Robert C. Howard, *Giannini Technical Notes*, Nov.-Dec. 1958, copy of Robert Perliss.

“AC Servo Design” by Robert C. Howard, *Giannini Technical Notes*, July-Aug. 1958, copy of Robert Perliss.

"The Second Order Linear Servo" by Robert C. Howard, *Giannini Technical Notes*, Sep.-Dec. 1959, copy of Robert Perliss.

"Free Gyros" by Sheldon C. Crane, *Giannini Technical Notes*, May-June 1959, copy of Robert Perliss.

Folder 6: 1970s

Letter from W. E. Keeney from the Optical Technology Division to A. Wallace and C. Bryant, commending several people, including Robert Perliss, "for their work in the Total Systems Integration Audit," April 2, 1970.

Memorandum from Robert Perliss to W. Keeney on the subject of Group Job Functions, Dec. 20, 1972, 3 p.

An invitation "to attend a Commemorative Day Program in the Optical Technology Division" on April 25, 1974.

"Task Authorization: Description of Space Telescope Optical Telescope Assembly T. A. No. ST-2 Appendix "B", January 12, 1976," manuscript copy of Robert Perliss, 38 p.

"Rerate Matrix," Feb. 2, 1979, 4 p.

Folder 7: 1980s

A certificate issued to Robert Perliss by the American Institute for Professional Education that he had completed the course Microprocessing Fundamentals given on January 9-11, 1980.

Letter from S. Palasciano, manager of the System Requirements Section of the Optical Technology Division, to "distribution" on the subject of "organizational announcement," 2 p., + corp. flowchart, April 6, 1981. (It mentions Perliss as Group Supervisor of Design Requirements.)

Letter to Perliss from Julianne A. Grace, Director of the Industrial Relations of the Optical Group, inviting him to participate in the Skills Inventory Program, Nov. 1981. (Sheets with Perliss's skills assessment are attached.)

Letter from "Jack" on Perkin-Elmer stationary to Robert Perliss that the contract had been terminated because of budgetary constraints and does not detract from the high standards of achievement established by the Perkin-Elmer's Dash-3 team, May 11, 1981, 1 p.

Perkin-Elmer employee bulletin from Dolores A. McCallion, Director of Employee Relations and Services to all Connecticut Supervisors about a series of recognition dinners for employees who had worked a certain number of years with the company, July 1, 1981, 3 p., copy of Robert Perliss.

Booklet "1981 Connecticut Service Recognition Dinner and Reception, July 22, Shorelands, E. Norwalk, Connecticut" produced by Perkin-Elmer, 5 p.

Certificate of Service awarded to Robert Perliss in recognition and appreciation of 20 years of service at Perkin-Elmer, Oct. 23, 1981.

Memorandum from L. R. Vreugle to Robert Perliss with the description of his new assignment as Task Manager responsible for the system performance verification, April 14, 1982, 1 p.

Memorandum from L. R. Vreugle to "Distribution" on the subject of Robert Perliss's reassignment with a copy of the new corporate flowchart attached, April 14, 1982, 2 p.

Invitation to Robert Perliss by the Optical Technology Division "to attend a Commemoration Ceremony and a Party to celebrate Program I achievements" on July 2, 1983.

"Connecticut Building Eastern States Exposition," Sept. 1983, 3 p.

Invitation to Robert Perliss to a celebration of the successful completion of the quarter panel project by Paul Brickmeier, on Sep. 22, 1983.

Perkin-Elmer's merit increase guidelines effective June 23, 1984, 7 p.

"Master Planning Form for Performance Evaluation," Nov. 1984, 3 p.

Certificate issued to Perliss that he had "completed the 24-hour training course sponsored by Perkin-Elmer on Dec. 10, 1984."

Letter from F. L. Harrigan, Jr., manager of Perkin-Elmer's Field Operations Department, to Robert Perliss thanking him on behalf of the entire Perkin-Elmer's West Coast Field Office Space Telescope Integration and Test Team for his efforts that had enabled them to meet the planned receiving, inspection, testing, and installation of the Optical Telescope Assembly into the Integration Support Stand. As a token of their appreciation, a photograph of the Optical Telescope Assembly in the Lockheed Vertical Assembly Test Area is enclosed. The inscription on the envelope with the photograph says, "Color photo of the interior of the Clean Lab."

Perkin-Elmer's merit increase guidelines effective June 29, 1985, 2 p.

Thank you card from Joseph Wuest to Robert Perliss for having spent time talking to him about his work on the HST, mailed on Oct. 11, 1985.

"1986 Connecticut Service Recognition Dinner and Reception, July 15" produced by Perkin-Elmer, 4 p.

"1986 Connecticut Service Recognition Dinner and Reception, July 15" produced by Perkin-Elmer, 10 p.

"Optical Group East 1986 Connecticut Service Recognition Reception, July 30" produced by Perkin-Elmer, 6 p.

Certificate of Service awarded to Robert Perliss in recognition and appreciation of 25 years of service at Perkin-Elmer, Oct. 23, 1986.

Certificate issued to Robert Perliss on April 16, 1987 by the Perkin-Elmer Technical Development Institute in recognition of his having completed Project Management.

Letter from William S. Raiford, Director of Space Telescope, to Robert Perliss, congratulating him and his team on a job well done, April 17, 1987. Attached is a letter to Raiford from Max E. Rosenthal, Acting Manager of the Optical Telescope Office at the Marshall Space Flight Center, expressing his thanks and appreciation to the Perkin-Elmer Personnel who had participated in the refurbishment of the Fine Guidance Sensor, April 8, 1987.

“1987 Connecticut Service Recognition Dinner and Reception, July 14” produced by Perkin-Elmer, 4 p.

“1987 Connecticut Service Recognition Dinner and Reception, July 14” produced by Perkin-Elmer, 11 p.

Folder 8: 1990s

“Hubble Space Telescope Electrical Power System: Fact Sheets,” April 4, 1990, 22 p.

Letter from Malcolm R. Currie, Chairman and CEO of Hughes, to John C. Rich, President of the Hughes Danbury Optical Systems of May 18, 1990 congratulating Rich and his team on the success of the Hubble Telescope. Attached is a note from John C. Rich to Bob Perliss of May 23, 1990 in which he says that Currie’s interest speaks for itself and commends Robert Perliss for his work.

Hughes Aircraft Company’s Bulletin by Malcolm R. Currie, Chairman of the Board, to all employees about the employee performance appraisals, Aug. 1, 1990.

Announcement by John C. Rich, President of HDOS, to all HDOS employees that each HDOS employee will receive a performance review at least annually, Aug. 30, 1990.

Pride Award from the Hughes Optical Systems to Robert Perliss in recognition of his extra effort and significant contribution on the HST launch support and verification team, Oct. 29, 1990.

Memo from D. Goux to R. Perliss about the HST Null Corrector, Dec. 3, 1990.

NASA Certificate Award given to Robert Perliss: 1991 NASA Group Achievement Award given on March 26, 1991 to Robert Perliss; NASA Goddard Space Flight Center’s certificate of recognition given to Robert Perliss on Nov. 1, 1991 and signed by John M. Klineberg, Director of GSFS; Letter from George Hogan, Director of HST Program, to Robert Perliss accompanying the group achievement awards above, April 14, 1992.

Letter from George Hogan, Director of HST Program, to Robert Perliss accompanying the NASA award above, June 1, 1992.

Folder 9: Robert Perliss’s Perkin-Elmer plans

“Employees Participating in the Profit-Sharing Plan for Salaried Employees,” informational letter by Perkin-Elmer, Oct. 30, 1967.

“To Participants in the Retirement Plan,” informational letter by Perkin-Elmer, Jan. 30, 1968.

“Profit-Sharing and Savings Plan for Salaried Employees,” informational letter by Perkin-Elmer, Oct. 29, 1968.

“Employees Participating in the Profit-Sharing and Savings Plan for Key Employees,” informational letter by Perkin-Elmer, Nov. 7, 1969.

Perkin-Elmer Employee Stock Ownership Plan punch cards of Robert Perliss for the years 1982, 1983, 1984.

Perkin-Elmer Profit Sharing and Savings Plan punch cards of Robert Perliss, 12 cards for the 1970s and 1980s.

Perkin-Elmer labor-time punch card of Robert Perliss.

Perkin-Elmer Employee Retirement Plan Certificate of Status of Robert Perliss, 3 sheets.

Perkin-Elmer Profit Sharing for Salaried Employees of Robert Perliss for the years 1963, 1964, 1967, 1970.

Folder 10: 2000s

“Ridgefield, CT, Celebrates International Year of Astronomy, 2009”: a double-page spread and computer printouts about the programs at the Ridgefield Library in conjunction with this event, including a slide presentation by Dr. Heidi B. Hammel titled “The Final Mission to Hubble” and a screening of the film *400 Years of Telescopes*. There’s a penciled note on one of the printouts: “Save for Bob Perliss.”

Folder 11: Undated Materials Included in the Robert Perliss’s Papers

Flowchart of KS-69 program

“The Space Telescope Observatory” by John N. Bahcall and C. R. Dell, to be published in the proceedings of IAU Colloquium # 54 on Scientific Research with the Space Telescope, 41 p., copy of Robert Perliss.

A handwritten sheet with notes

Robert Perliss’s employee ID card and key chain with Perkin-Elmer Optical Telescope Assembly Edwin P. Hubble Space Telescope symbols (in the box).

Folder 12: Envelopes with Photographs (not related to Perliss)

HST: 3 10x8” photographs of the signing of a contract with a group of Perkin-Elmer employees present on April 10, 1987; the HST Team OV group outside the building in Dec. 1990; an undated photograph of HST team of the month outside the building. All color.

HST, Comet Levy: a photograph of Comet Levy with a digital enlargement in an insert; an enlargement of Comet Levy; another enlargement of Comet Levy. All black-and white.

HST, Jan 24, 1986: the HST in the lab on the Delta sling being moved; the HST on the dolly with the sling removed; the HST being lowered into a horizontal position. All color.

HST Assembly: an artist's concept of what the HST would look like in space, 2 copies; a photograph of the primary mirror for the HST, 2 copies; a photograph of the primary mirror being lowered into the main assembly ring, 2 copies; a photograph of the joining of the Focal Plane Structure with the main ring assembly, 2 copies; a photograph showing joining the secondary mirror assembly to the main telescope; a photograph from the HST showing a gravitational lens. All color.

HST: a black-and-white photograph of the optical telescope assembly.

HST: a color photograph of the HST just after release from the space shuttle.

HST: a black-and-white photograph of an artist's concept of what the HST would look like in space.

HST: a photograph of an astronaut during the space mission; a photograph of an astronaut poised on the repair arm of the space shuttle with the HST just below him; a photograph of the HST orbiting above the earth. All 8x10" in color.

HST: a photograph of a model of the HST that could be walked through in a museum; 2 photographs of a model of the HST in a case with a display about the HST in the background; a photograph of the signage outside the larger walk-through model. All color.

HST: an internal component of the HST, possibly the photography component; a close up of an internal unit of the HST, possibly the photography component. Both black-and-white.

HST: a series of five photographs, showing aerial views of unknown locations. Both black-and-white.

6 black-and-white photographs, capturing a rocket launch.

Box 6

The Space Telescope by David Ghitelman, published by Gallery Books, imprint of W. H. Smith Publishers, Inc., 1987, 143 p.

The Hubble Wars: Astrophysics Meets Astropolitics in the Two-Billion –Dollar Struggle Over the Hubble Space Telescope by Eric J. Chaisson, Harper Collins Publishers, 1st ed., 1994, xi, 386 p., [8] p. of color plates.

Optics Plus: Merging Electronics and Mechanics with Optics, published by the Perkin-Elmer Corp. in Norwalk, CT in 1953, 59 p.