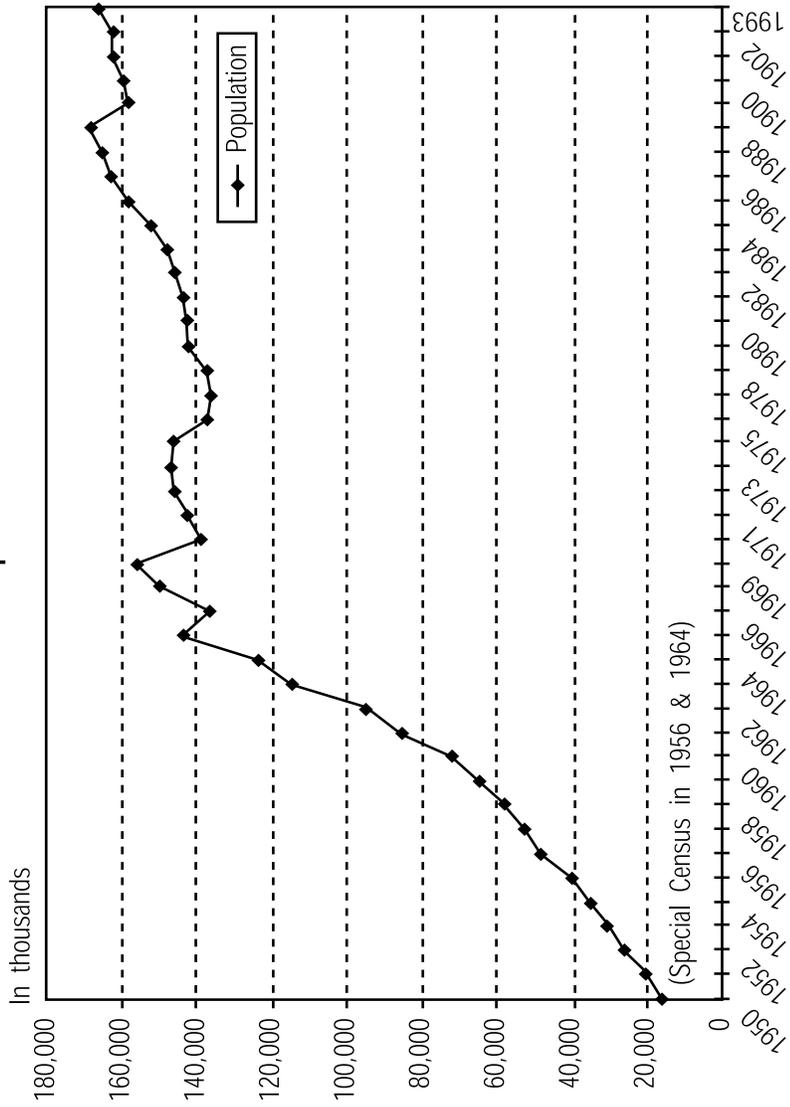


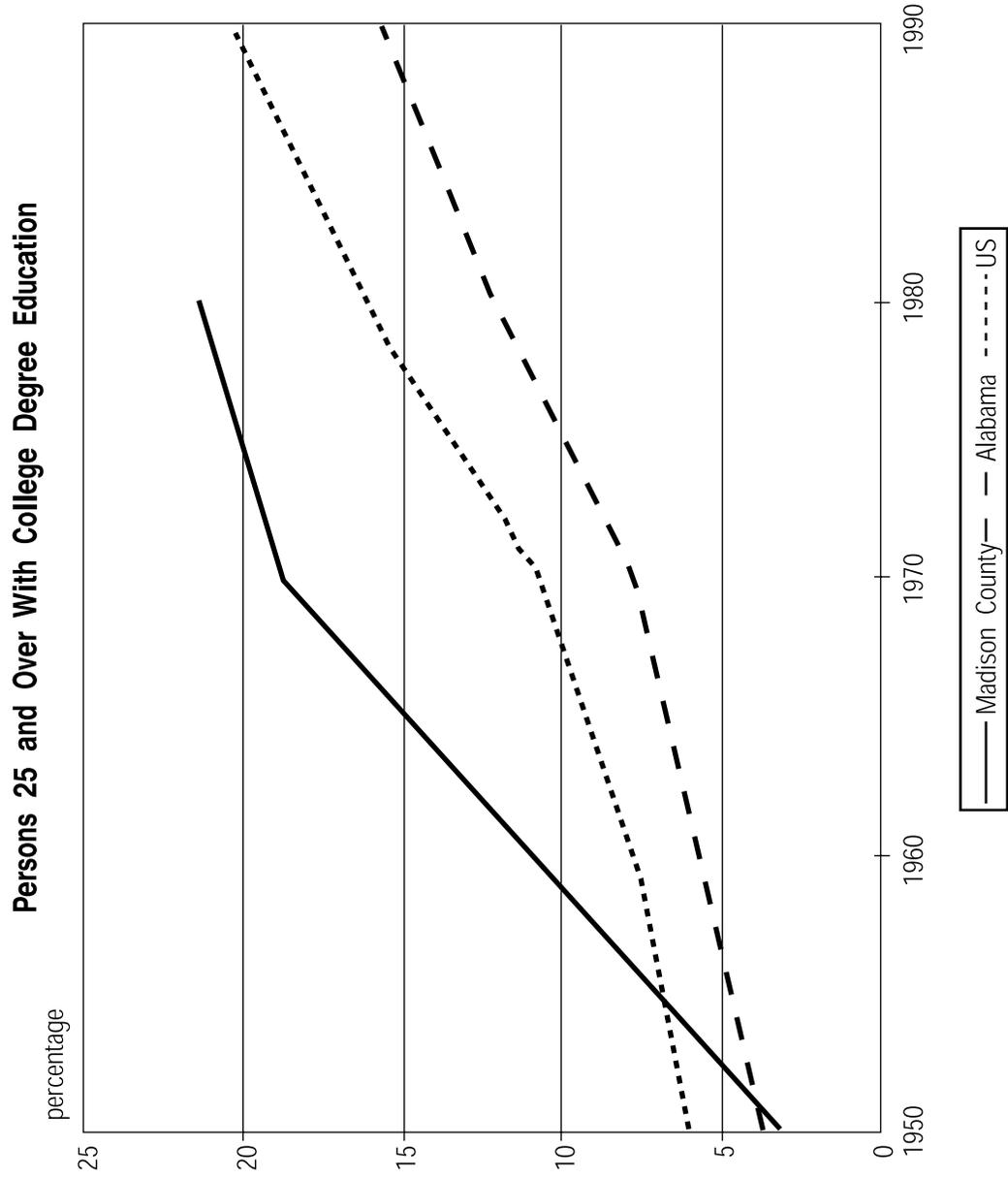
Appendix H:

Huntsville Area Social and Economic Change

Huntsville Population 1950–1993



Source: Connie Graham, Huntsville Planning Department; Huntsville/Madison County Chamber of Commerce; Huntsville/Madison County Public Library, Heritage Room; figures for 1966 through 1979 were obtained from *Sales Management and Sales and Marketing Management Survey of Buying Power*; 1990 from Alabama Industrial Relations



Sources and Research Materials

Marshall Space Flight Center's documentary collections relating its history are uneven, primarily because the Center had no history office from 1975 until 1986. When the office closed, Marshall sent many of these documents to the National Archives annex in Atlanta, and retrieval is complicated because shelf lists are incomplete and some of the documents have apparently been lost.

Today, Marshall's historical documents are in several collections. Most important are the History Archives, housed in Building 4203. This collection is built around a collection formerly used as a resource by the Office of the Center Director. It contains correspondence, Weekly Notes, official documents, and other records relating to projects, management, institutional issues, and other Centers, Headquarters, and other issues of interest to top management. The History Office, located in Building 4200, has a wide range of documents and other resources (including videotapes) collected since the office reopened in 1986, but covering all periods of Marshall's history. Many of the key documents are available on fiche. The histories of Marshall's involvement in Shuttle and Space Station have been documented by a contractor under the supervision of the history office. The Shuttle and Station materials include documents, annotated chronologies, and interviews.

Other collections on the Center and at the adjacent Redstone Arsenal have information on Marshall's history. The Marshall Document Repository houses technical documents on the Center's projects. The Redstone Scientific Information center is an Army regional library with a rich collection of documents, publications, and on-line retrieval systems. The Arsenal also has its own history office, which has information on pre-Marshall ABMA missile development in Huntsville.

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Two other sites in Huntsville contain information on Marshall. The Space and Rocket Center holds documents of some retirees from Marshall, including many of the original German team. The Special Collections Department of the library at the University of Alabama in Huntsville houses a collection of materials assembled for Roger Bilstein's book on Saturn. The Saturn collection has interviews, technical and managerial documents, and brochures from prime contractors.

Because the two Centers have worked together on most of NASA's major human spaceflight projects, the history office at the Johnson Space Center in Houston has many resources relating to Marshall's history, including chronological document collections relating to Mercury, Apollo, Skylab (housed at the Fondren Library at Rice University), Shuttle, and Space Station. Several Houston projects over the years have conducted interviews, and many of these discuss Marshall. Many of the collections of the NASA Headquarters history office in Washington have information on Marshall. A vertical file containing an extensive clipping file and numerous documents includes biographical files on key NASA personnel, program files, and files on each of the NASA Centers. The office also has the papers of several NASA administrators and deputy administrators; the Fletcher and Myers papers in particular have material relating to Marshall. Management and administrative collections also bear on Marshall's history.

Other sites in Washington also have useful materials. The Space Division of the National Air and Space Museum has interviews Robert Smith conducted for his book on the Hubble Space Telescope. In addition, the National Archives houses the records of the presidential commission that investigated the *Challenger* accident. The commission records contain over one hundred interviews undertaken by the investigation staff and thousands of documents on over seventy reels of microfilm.

Most prominent among the publications dealing with the origins of Marshall Space Flight Center are those dealing with the Germans who came to Huntsville as a result of Operation Paperclip. The authors of most of these works were people who knew and worked with Wernher von Braun; these works comprise what historian Rip Bulkeley called the "Huntsville school" of aerospace history. The best of these works are Ernst Stuhlinger and Frederick I. Ordway III, *Wernher von Braun, Crusader for Space: A Biographical Memoir* (Malabar, Florida: Krieger Publishing Company, 1994) and Ordway and Mitchell R. Sharpe, *The Rocket Team* (New York: Thomas Y. Crowell, 1979). Michael Neufeld's *The*

Rocket and the Reich (New York: Basic Books, 1994), published as this book entered its final review process, is the most scholarly study of the German World War II missile program at Peenemünde. Neufeld shared many of his insights and allowed us to see chapters of his work in progress.

Roger Bilstein's *Orders of Magnitude: A History of the NACA and NASA, 1915–1990* (NASA SP–4406, 1989) is a useful overview. A more interpretive study of NASA's evolving culture is Howard E. McCurdy's *Inside NASA: High Technology and Organizational Change in the U. S. Space Program* (Baltimore: Johns Hopkins University Press, 1993). Other histories of NASA Centers in the NASA History Series that have information about Marshall include Charles D. Benson and William B. Faherty, *Moonport: A History of the Apollo Launch Facilities and Operations* NASA SP–4204 (Washington, 1978); Virginia P. Dawson, *Engines and Innovation: Lewis Laboratory and American Propulsion Technology* (NASA SP–4306, 1991); Henry C. Dethloff, *Suddenly, Tomorrow Came...: A History of the Johnson Space Center* NASA SP–4307 (Washington, DC, 1993); and James R. Hansen, *Engineer in Charge: A History of the Langley Aeronautical Laboratory, 1917–1958* (NASA SP–4305, 1987).

The political history of the origins of NASA, and of the absorption of ABMA by the Agency, are treated in Walter McDougall's *The Heavens and the Earth* (New York: Basic Books, Inc., 1985) and Robert A. Divine's *The Sputnik Challenge* (New York: Oxford University Press, 1993). Books by participants in these events with significant treatment of ABMA include J.D. Hunley (editor), *The Birth of NASA: The Diary of T. Keith Glennan* (Washington, DC: NASA History Series SP–4105) and Major General John B. Medaris with Arthur Gordon, *Countdown for Decision* (New York: G. P. Putnam's Sons, 1960). The best internal Marshall treatment of the Center's origins is David S. Akens, "Historical Origins of the George C. Marshall Space Flight Center," MSFC Historical Monograph No. 1 (Huntsville: MSFC, 1960). Most of the books that deal with the early space program concentrate on astronauts rather than engineers. An exception is Sylvia Doughty Fries, *NASA Engineers and the Age of Apollo* (NASA SP–4104, 1992).

Although many books discuss the Apollo Program, few cover MSFC in any detail. By far the most detailed history of the Center in the 1960s is Roger Bilstein's *Stages to Saturn: A Technological History of Apollo/Saturn* NASA SP–4206 (Washington, DC, 1980). The book is especially valuable because many of the documents that Bilstein used have since been lost. Other

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noteworthy works are: John A. Logsdon, *The Decision to Go to the Moon: Project Apollo and the National Interest* (Cambridge, Mass.: MIT Press, 1970); Charles Murray and Catherine Bly Cox, *Apollo: The Race to the Moon* (New York: Simon and Schuster, 1989); Dale Carter, *The Final Frontier: The Rise and Fall of the American Rocket State* (London: Verso, 1988); Courtney G. Brooks, James M. Grimwood, Loyd S. Swenson, *Chariots for Apollo: A History of Manned Lunar Spacecraft* NASA SP-4205 (Washington, DC, 1979); William D. Compton, *Where No Man Has Gone Before: A History of the Lunar Exploration Missions* NASA SP-4214 (Washington, DC, 1989); Norman Mailer offers colorful accounts of von Braun and the Apollo 11 launch in *Of a Fire on the Moon* (Boston, Little, Brown, 1969).

Several NASA publications provide statistics regarding institutional development of the Agency, with detailed information on individual Centers. The three volumes of the *NASA Historical Data Book* (Volume I, NASA Resources, 1958–1968 edited by Jane Van Nimmen, Leonard C. Bruno, and Robert L. Rosholt, SP-4011, 1976; Volume II, Programs and Projects, 1958–1968, and Volume III, Programs and Projects, 1969–1978, edited by Linda Neuman Ezell, SP-4012, 1988) are invaluable resources. Arnold S. Levine's *Managing NASA in the Apollo Era* (NASA SP-4102, 1982) analyzes NASA administration of budgets, planning, personnel, and interagency relations.

Books that shed light on Marshall's diversification include: W. David Compton and Charles D. Benson, *Living and Working in Space: A History of Skylab* NASA SP-4208 (Washington, DC, 1983); C. A. Lundquist, *Skylab's Astronomy and Space Sciences* NASA SP-404 (Washington, DC, 1979); J. A. Eddy, *A New Sun: The Solar Results from Skylab* NASA SP-402 (Washington, DC, 1979); Wallace H. Tucker, *The Star Splitters: The High Energy Astronomy Observatories* NASA SP-466 (Washington, DC, 1984); R. J. Naumann and H. W. Herring, *Materials Processing in Space: Early Experiments*, NASA SP-443 (Washington, DC, 1980); Douglas R. Lord, *Spacelab: An International Success Story* NASA SP-487 (Washington, DC, 1987). Robert W. Smith's *The Space Telescope: A Study of NASA, Science, Technology, and Politics* (Cambridge: Cambridge University Press, 1993) is a magisterial account of the Hubble Space Telescope.

Although it concentrates more on documents generated at Houston and Headquarters, the voluminous six-volume "Shuttle Chronology, 1964–1973"

edited by John F. Guilmartin, Jr., and John Walker Mauer, JSC Management Analysis Office, 1988, has many documents that relate to Marshall's role in early Shuttle development.

The key source for the *Challenger* accident are the five volumes of the Presidential Commission (Washington, DC: US GPO, 6 June 1986). These volumes contain the Rogers Commission report, transcripts of hearings, reports of the NASA task groups, and many key documents from the Shuttle program. Neither the hearings or the published documents give a full record of pre-accident events. The secondary literature on the *Challenger* accident is extensive, but mainly follows the interpretation of the commission report. The main works are: Malcolm McConnell, *Challenger: A Major Malfunction, A True Story of Politics, Greed, and the Wrong Stuff* (Garden City, New York: Doubleday, 1987); Joseph Trento, *Prescription for Disaster* (New York: Crown, 1987); Diane Vaughn, "Autonomy, Interdependence, and Social Control: NASA and the Space Shuttle Challenger," *Administrative Science Quarterly* 35 (June, 1990); Frederick F. Lighthall, "Launching the Space Shuttle *Challenger*: Disciplinary Deficiencies in the Analysis of Engineering Data," *IEEE Transactions on Engineering Management* (February, 1991); Gregory Moorhead, Richard J. Ference, and Chris P. Neck, "Groupthink Decision Fiascoes Continue: Space Shuttle Challenger and a Revised Groupthink Framework," *Human Relations* 44 (June 1991); Phillip K. Tompkins, *Organizational Communication Imperatives: Lessons of the Space Program* (Los Angeles: Roxbury Publishing, 1993); Thomas F. Gieryn and Anne E. Figert, "Ingredients for a Theory of Science in Society: O-Rings, Ice Water, C-Clamp, Richard Feynman, and the Press" in Susan E. Cozzens and Thomas F. Gieryn, eds., *Theories of Science in Society* (Bloomington: University of Indiana Press, 1990). Commission member Richard P. Feynman describes his work on the investigation in "What Do You Care What Other People Think?" *Further Adventures of a Curious Character* (New York: Norton, 1988).

Howard E. McCurdy's *The Space Station Decision: Incremental Politics and Technological Choice* (Baltimore: The Johns Hopkins University Press, 1990) examines the political struggle to win approval for NASA's "next logical step." Adam L. Gruen's *The Port Unknown: A History of the Space Station Freedom Program* (NASA SP-4217, 1995) examines from a Washington perspective the politics, budgets, and configuration changes that characterized *Space Station Freedom's* developmental rollercoaster.