The Military-Industrial Complex: Tracing the Effects of Defense Production on General Electric's Growth WWII-1970

By
Jeffrey D. Lounsbury

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ABSTRACT

Lounsbury, Jeffrey

General Electric and the Military-Industrial Complex, World War II-1970

This thesis examines General Electric's role within the Military-Industrial Complex from World War II to 1970, with a particular focus on how defense work affected General Electric's growth during this period. The study relies heavily on two General Electric publications, the company's annual reports and *The General Electric Monogram*, and is also based on a number of secondary sources. For purposes of analysis, this thesis has been divided into three periods: WWII-1952, 1953-1961, and 1962-1970. Each section details General Electric's work as a defense contractor, indicates what portion of the company's total sales was from defense production, and describes how defense research was applied to the development of consumer products.

Many scholars have justifiably criticized the Military-Industrial Complex because it can lead to political corruption and unnecessary defense spending by the government. However, the defense work of General Electric from World War II to 1970 was beneficial to America in many respects. With the help of General Electric and other defense contractors, the American government was able to provide for the nation's security by fielding a well equipped and technologically advanced military during World War II and the Cold War era.

General Electric's defense production from World War II to 1970 also played an important role in facilitating the growth of the company. Not only was defense production a steady source of income for General Electric, it also gave the company

inroads into space research, jet engine production, and the design and construction of nuclear power plants, all of which would become increasingly profitable endeavors during the 1960's. Furthermore, General Electric's government sponsored research and development allowed the company to apply new technologies to its consumer products. Even so, General Electric downplayed the importance of its defense work to the success and growth of the company. Instead, sensitive to the perception that it was profiting excessively from government contracts, General Electric portrayed its defense production as an act of good citizenship that contributed to America's military strength and security.

Throughout much of the 20th century, the United States government and military have worked cooperatively with private enterprises in order to create the strongest possible military force for our country. In the modern era, the government has entrusted private enterprises and academia with the responsibility of conducting research and developing defense products that are essential for the military.

President Dwight D. Eisenhower popularized the term "Military-Industrial Complex" as a way to describe the relationship between the government, military, and private enterprises. Eisenhower viewed the "Military-Industrial Complex" as a potential threat to American society, for it promoted high levels of defense spending, which Eisenhower believed to be detrimental to the American economy. Eisenhower feared that the "Military-Industrial Complex" could give too much power to the military and defense contractors, and therefore create a "garrison state."[1] During his farewell address on June 17, 1961, Eisenhower warned the American public that "only an alert and knowledgeable citizenry can compel the proper meshing of the huge industrial and military machinery of defense with our peaceful methods and goals so that security and liberty may prosper together."[2]

Since Eisenhower's speech, many historians have assessed the influence of the Military-Industrial Complex in scholarly treatments published during the latter half of the 20th century. For the most part, these scholars share Eisenhower's concern over are the effects that the Military-Industrial Complex can have on American society.

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[1] James T. Patterson, *Grand Expectations: The United States, 1945-1974* (New York: Oxford University Press, 1996) p. 289.
[2] Diane Ravitch, *The American Reader: Words That Moved A Nation* (New York: HarperCollins, 1990) p. 537.

In examining the Military-Industrial Complex, one issue that scholars have focused on is whether private enterprises have unfairly profited from their defense work during periods of war. Historians also debate when the Military-Industrial Complex came into existence in the United States, which of the three agents (military, industry, politicians) within the Military-Industrial Complex has the most power, what sort of role the Military-Industrial Complex plays during times of peace and what impact it has on the American economy.

In this paper, I have first summarized the perspectives of various scholars on the Military-Industrial Complex, and have then examined the role played by General Electric in defense production during the post-WWII/Cold War era. General Electric was one of the primary companies the government relied on to conduct military research and development during this period. Through my research, I have concluded that from World War II through 1970, the American military, American consumers, and General Electric itself benefited significantly from General Electric's work as a defense contractor. Among other things, General Electric played an important role in atomic research, the development of radar, and the design and construction of jet engines. These and other defense projects contributed to a strong military, while the technology developed by General Electric had widespread application to non-military products and services, benefiting both the company and American consumers.

My paper is divided into five chapters. The first chapter is a literature review that describes the origins of the Military-Industrial Complex as well as the views of various scholars on how it functions and affects American society. The following three chapters describe General Electric's experience as a defense contractor and

explain how defense production affected the growth of the company. The second chapter tracks General Electric from 1945-1952, while briefly examining the company's contribution to World War II mobilization. The third chapter covers 1953-1961, and the fourth 1962-1970. The fifth and final chapter will draw conclusions regarding General Electric's role within the Military-Industrial Complex, and how defense work and commercial offshoots fueled the company's growth.

I. Literature Review

A strong link between the government, military, and defense contractors was established in America during World War II as the country mobilized to wage war against Germany and Japan. Immediately following World War II America partially demobilized, and government defense spending declined. During the early 1950s, however, the close link between the government, military, and defense contractors was renewed. The Soviet Union emerged as a nuclear superpower, and from 1950 through 1953, the United States and democratic forces squared off against communist enemies in the Korean War, which increased Cold War tensions. Political scientist Samuel Huntington explains that during this period, there was a "perceived need to deter, and if necessary, to repel Soviet or Chinese aggression."[3]

Throughout the Korean War, most defense work was done by large companies such as General Electric for whom defense production was only a portion of their business. After the war, however, companies solely devoted to military production formed as a result of new weapons developments. These companies were extremely dependent upon the Department of Defense as a buyer of their goods. In order to remain profitable, they needed the Department of Defense to consistently purchase their military products, regardless of whether the country was at war.[4]

President Eisenhower, who served as president from 1953 to 1960, fully understood the pressure this "Military-Industrial Complex" created for heightened

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[3] Omer L. Carey, *The Military-Industrial Complex and United States Foreign Policy* (Pullman: Washington State UP, 1969) p. 9.
[4] Ibid, p. 7.

defense spending, particularly in the context of the Cold War. Although the term "Military-Industrial Complex" was not coined by Eisenhower until 1961, the idea that a Military-Industrial Complex exists in the United States has its origins in the work of C. Wright Mills, a professor of sociology at Columbia University. In *The Power Elite*, published in 1965, Mills expressed his thoughts on the relationship between government, military, and private industry. He argued that a "power elite" existed in the United States at the national level, comprised of high officials within the government and military, and the top executives of large corporations.[5] According to Mills, "the power elite" were in positions that enabled them to "transcend the ordinary environments of ordinary men and women; they are in positions to make decisions having major consequences."[6] The majority of its members were thought to be upper class, native-born, from urban areas and the east coast, Protestant, and highly educated.[7]

Mills describes the evolution of the "power elite" through American history by dividing it into five epochs. During the first epoch (from the American Revolution until 1797), "social life, economic institutions, military establishment, and political order coincided," making it easy for elite men to have a profound impact on all of these institutions.[8] In the second epoch, decentralization of American society caused economic, political, and military power to "fit more loosely into the great scatter of

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[5] C. Wright Mills, *The Power Elite* (New York: Oxford UP, 1956) p. 7.
[6] Ibid, pp. 1-2.
[7] Ibid, p. 279.
[8] Ibid, p. 270.

the American social structure."[9] Mills characterizes the third epoch (from 1866 to World War I) as being a period in which economic elites had great influence over government and military institutions.[10] During the fourth epoch (New Deal to the conclusion of WWII) the New Deal removed power from the economic elite, which effectively put the government, military, and private enterprises on an even playing field.[11]

In the fifth and final epoch (post-WWII to 1956), Mills feared that the politicians within the "power elite" were being dominated by corporate and military men, claiming, "not politicians, but corporate executives, sit with the military and plan the organization of war effort."[12] Mills considered this to be undemocratic in the sense that these corporate executives were not elected by the American population, and therefore should not have the ability to make decisions that affect the entire population. Furthermore, Mills feared that many corporate and military men within the "power elite" would not be held accountable for their decisions. Given that the military valued the opinions of corporate executives more than those of politicians, Mills worried for the general welfare of the American population. Mills' idea of the "power elite" is quite similar to the concept of the Military-Industrial Complex, and the concerns he expresses over the excessive influence of corporate executives and military officials are synonymous to those expressed by Eisenhower.

Various perspectives of the Military-Industrial Complex in the post-WWII/Cold War era are provided in Omer Carey's *The Military-Industrial Complex*

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[9] Ibid, p. 270.
[10] Ibid, pp. 271-272.
[11] Ibid, pp. 272-273.
[12] Ibid, p. 276.

and United States Foreign Policy. Carey, a former professor at Washington State University, compiles five scholarly papers on the Military-Industrial Complex into one text. The five authors included in this text are Samuel P. Huntington, Walter Adams, Murray L. Weidenbaum, Ralph E. Lapp, and Patrick M. Morgan. These papers were presented during the spring of 1969 at the World Affairs Institute Committee, which was held as a forum for discussion on the Military-Industrial Complex. The Military-Industrial Complex was a topic of interest in 1969 because the United States was involved in both the Vietnam and the Cold Wars, and the role of certain corporations in producing defense materials was especially controversial. For example, Dow Chemicals' creation of napalm for the Air Force caused protest at college campuses across the country. The authors of the papers included in this text offer a wide variety of opinions on the Military-Industrial Complex. Carey does not share his personal opinion, and there is no evidence that he framed these papers in any particular manner.

Huntington appears to champion the military research and production done by private corporations under the guidance of the government during the Cold War era. He explains that following World War II, the United States continued to focus on strengthening its military power, much in part to Cold War concerns. During the Kennedy-Johnson-McNamara years, innovations made by defense contractors such as General Electric "tremendously enhanced American military power, strategic and conventional, and made possible not only continued American superiority in the

nuclear arms race but also American involvement in a major overseas war without recourse to general mobilization."[13]

Adams believes that governmental action was able to dictate the behavior of both the military and private enterprises during the post-WWII/Cold War era. By supporting the international weapons race, the government generated a demand for the production of technologically advanced weaponry.[14] Adams states, "The government not only permits and facilitates the entrenchment of private power but serves as its fountainhead."[15] This idea directly contrasts with Mills' thesis, which is that the government is subordinate to private corporations and the military within the "power elite".

In her analysis of the Military-Industrial Complex in the post-WWII/Cold War era, Weidenbaum provides suggestions as to how public policy can prevent particular corporations and their executives from unfairly reaping war profits.[16] Weidenbaum believes that the primary way in which government-industrial abuses can be deterred is by "changing governmental procurement policies and practices so as to halt the erosion of the basic entrepreneurial character of the firms that undertake large-scale developmental programs for the federal establishment and to reorient these firms to serving private as well as public requirements." [17] Although Weidenbaum acknowledges the importance of the military in keeping the peace, she expresses

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[13] Carey, p. 1.
[14] Ibid, p. 17.
[15] Ibid, p. 17.
[16] Ibid, p. 2.
[17] Ibid, p. 38.

concern over the threat that the Military-Industrial Complex poses to society if not managed properly. In this sense, her opinion is quite similar to that of Mills.

Lapp supports the basic argument initially proposed by Huntington that military influence has continued to grow during the Cold War. Furthermore, he stresses the ways in which the government, military, and private enterprises continue to be intertwined in the post-WWII/Cold War era.[18] In fact, Lapp goes as far as to claim that the Military-Industrial Complex was a "Second government existing almost independently within our democracy."[19] Finally, Morgan places the Military-Industrial Complex in a larger perspective by explaining that other countries besides the United States have also had difficulty keeping tabs on the relationship between government, military, and private industry.[20] Morgan speculates in his paper that the Military-Industrial Complex is not necessarily as influential as many believe it to be.

These papers by Lapp, Weidenbaum and Morgan are each consistent with certain arguments put forth by Mills in *The Power Elite*. Mills identifies the close relationship between government, military and private enterprises (Lapp), stresses the importance of preventing particular individuals and corporations from benefiting from the Military-Industrial Complex (Weidenbaum), and acknowledges that other countries besides the United States are affected by the Military-Industrial Complex (Morgan).

Most historians believe that the Military-Industrial Complex began in the United States during the World War II era, when private industry cooperated with the

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[18] Ibid, p. 27.
[19] Ibid, p. 43.
[20] Ibid, p. 35.

government to mobilize for an unprecedented war effort. However, according to Paul Koistinen, the author of *The Military-Industrial Complex: A Historical Perspective*, the foundation for the Military-Industrial Complex was laid during World War I. In support of this claim, Koistinen explains that military officers and members of the War Industries Board (composed of high ranking businessmen) shared the responsibility of making wartime decisions during World War I.

Koistinen agrees with Mills that a "power elite" existed in the United States, but the two scholars disagree somewhat as to how the power elite functions. Koistinen argues, "a power elite made up of business, banking, and industrial leaders, dominates the government and thus controls the military."[21] Koistinen is clearly of the opinion that private corporations hold more power than the government and the military within the "power elite," which contrasts with Mills' belief that corporate and military executives together control politicians within the "power elite." In both Koistinen's and Mills' opinions, the government is subverted by excessive influence from private corporations, which makes the American society undemocratic.

Koistinen is generally critical of the effects that the Military-Industrial Complex has on both civil-military relations and the business-military partnership.[22] He agrees with Mills' belief that in America, there is "socialism for the rich; free enterprise for the poor."[23] Koistinen believes that one of the reasons the Military-Industrial Complex exists in the United States is because there has never been a

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[21] Paul A.C. Koistinen, *The Military Industrial Complex: A Historical Perspective* (New York: Praeger, 1980) p. 2.
[22] Ibid, p. 2.
[23] Ibid, p. 15.

widespread radical movement driven by the lower class.[24] According to Koistinen, this has caused elite leadership to be "rather consistently shortsighted in terms of its own and the nation's larger interests."[25] As a result, Koistinen explains that reform movements in the United States have only made minimal changes to the high level of poverty, as well as the social welfare, transportation, communication, and economic systems.[26] Given these conclusions, Koistinen supports Mills' argument that the Military-Industrial Complex has a harmful effect on society.

In contrast to Koistinen, Gregory Hooks takes the more common viewpoint that the Military-Industrial Complex came into existence in the United States during the World War II era. In *Forging the Military-Industrial Complex: World War II's Battle of the Potomac*, Hooks focuses is on the economic mobilization that took place during World War II and the postwar impact of this mobilization. It is his belief that the defense spending necessary for World War II mobilization allowed the United States to transition from the Great Depression to the booming 1940s.[27] Hooks also describes the ways in which World War II mobilization affected Cold War mobilization. He argues, "The World War II mobilization provided the material foundations for a vast postwar industrial planning effort centered in the Pentagon and devoted to national security goods."[28] In this sense, Hooks believes that the success of World War II mobilization provided the incentive and set the pattern for the

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[24] Ibid, p. 15.
[25] Ibid, p. 15.
[26] Ibid, p. 15.
[27] Gregory Hooks, *Forging the Military-Industrial Complex: World War II's Battle of the Potomac* (Urbana: University of Illinois, 1991) pp. 2-3.
[28] Ibid, p. 6.

government, private corporations, and the military to work cooperatively in producing military goods in the postwar era.

Hooks goes on to claim that World War II mobilization led to the rise of the "national security state" and laid the material foundation for the Military-Industrial Complex. In a "national security state," according to Hooks, the military is the most powerful entity within society and therefore controls the direction taken by the country. The private firms involved in World War II mobilization were stronger following the war, yet they continued to be under the influence of the United States military.

Hooks is wary of the power of the Pentagon in the post-WWII era, and believes that it is difficult for democracy to flourish with the military holding the most power in American society. He argues, "The state's authority and ability to shape economic activity presently monopolized by the Pentagon must be transferred to, and adapted by, new civilian agencies that are both more democratic and more concerned with society's needs."[29] Hooks clearly believes that the power of the military within the Military-Industrial complex must be curbed by elected government officials, whose job it is to protect democratic principles and the needs of the general population. Hooks' warnings about the power of the Pentagon and the dangers posed by the Military-Industrial Complex are very similar to the warnings given by President Eisenhower in his farewell speech.

Hooks concludes that the private firms involved in World War II were clients of the Pentagon during and after World War II, and were not self-governing

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[29] Ibid, p. 275.

entities.[30] While Hooks applauds Mills' work on the "power elite", he views the military as having the most power within the Military-Industrial Complex in the post-WWII era. This conclusion is at odds with Mills' argument, which is that private corporations and the military were equals within "the power elite". Speaking of Mills, Hooks remarks, "I find his insights into the structure and dynamics of power in the U.S. and on the importance of World War II to be instructive."[31]

Stuart Brandes, a former professor of history at the University of Wisconsin-Rock Country, studies the ethics of whether individuals or groups can rightly profit from war in *Warhogs: A History of War Profits in America*. If the answer to this question is yes, he asks to what degree, and how does one decide which groups or individuals should profit?[32] In an exploration of this issue starting with the American Revolution, Brandes found that there is a long history of profiting from war. When a particular country is victorious in war, the government, military, and private enterprises all benefit. The government and military are commended for the planning behind the successful military engagement, and private enterprises make large profits from the their production of wartime goods.[33] Even if this war was unjust or unnecessary, private corporations as well as the nation's economy gain from wartime mobilization.

In Brandes' view, the Military-Industrial Complex can unnecessarily promote war and unfair profits for corporations involved in wartime mobilization. Even during

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[30] Ibid, p. 5.
[31] Ibid, p. 4.
[32] Stuart Brandes, *Warhogs: A History Of War Profits In America* (University Of Kentucky Press, 1997) p. 3.
[33] Ibid, p. 5.

times of peace, the American government has been accused of unnecessarily subsidizing private enterprises' production of defense materials with the hope of stimulating the economy.[34] Brandes clearly recognizes the harmful effects that the Military-Industrial Complex can potentially have on society, and therefore is in agreement with the concerns expressed by Mills and others.

Brandes claims that World War II was the first mobilization where the American government tried to learn from its past experiences with defense contractors profiting excessively from war, or "profiteering".[35] According to Brandes, the government did not properly manage the level of profits earned by private corporations involved in World War I mobilization.[36] Earning profits during wartime periods was unavoidable; the government simply needed to find a fair way to limit these profits.[37] Brandes believes that World War II was the first time that the American government made a conscious effort not to allow individual businesses to profit excessively from war.[38] Unlike Koistinen, Brandes does not make the claim that private corporations or the military were dominating the government within the Military-Industrial Complex. Brandes credits Franklin Delano Roosevelt for being committed to working out ways of spreading the wealth acquired from victory more evenly.[39]

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[34] Ibid, p. 5.
[35] Ibid, p. 9.
[36] Ibid, p. 7.
[37] Ibid, pp. 6-7.
[38] Ibid, p. 7.
[39] Ibid, p. 9.

Now that various perspectives on the Military-Industrial Complex have been summarized, the remaining portion of the literature review will focus on General Electric. The role played by General Electric in defense production during WWII and the post-WWII era has been discussed by various writers. General Electric was one of the primary private enterprises that conducted research and produced goods pertaining to defense during this period. The United States government funded this research and production for the benefit of the military through defense contracts, that were, at least to some extent, secured through lobbying efforts by companies seeking this work.

John Anderson Miller's *Men and Volts at War; The Story of General Electric in World War II*, which was published directly after World War II, details the work undertaken by General Electric for the United States military during the war. Miller's book is largely a celebratory account; he "tells the story of how the largest electrical manufacturing company mobilized all its experience, skill, and resourcefulness for America's war effort on land, at sea, and in the air."[40] He explains that General Electric not only helped to manufacture many wartime necessities (weaponry, ships, planes, tanks and motors), but also made incredible technological advancements that strengthened the war effort. The speed at which private companies such as General Electric were able to manufacture war materials was greatly underestimated by the Axis powers, which gave the Allies a significant advantage.[41] According to Miller,

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[40] John A. Miller, *Men and Volts at War; The Story of General Electric in World War II* (New York: Whittlesey House, 1947) p. vi.
[41] Ibid, p. v.

the assistance provided by General Electric during World War II played an integral role in allowing the Allies to triumph.[42]

Major A. Johnson, a longtime electronics engineer for General Electric, also details the contributions made by General Electric during the World War II era in *Progress in Defense and Space: A History of the Aerospace Group of the General Electric Company*. Although *Progress in Defense And Space* was written several decades after *Men and Volts at War*, it shares the same celebratory tone towards General Electric. Johnson glorifies the accomplishments of General Electric during the World War II era; the company worked on developing radar, creating jet engines, furthering ballistic missile technology, and helping to develop the atomic bomb.[43] As a result of the United States' success in World War II and the significant amount of funding received from the government, General Electric had become one of America's most powerful corporations at the conclusion of the war.

James Deakin's *The Lobbyists* provides insight into General Electric's lobbying efforts for defense contracts. Deakin describes the ins and outs of lobbying by defense businesses in Washington during the late 1950s and into the 1960s. He explains that it is incredibly difficult to pinpoint the number of individuals lobbying for a particular defense contractor because of loopholes in laws requiring lobbyists to identify themselves. Given these loopholes, Deakin concludes that there was essentially "no legal requirement that defense lobbyists seeking military contracts

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[42] Ibid, pp. v-vii.

[43] Major A. Johnson, *Progress In Defense And Space: A History Of The Aerospace Group Of The General Electric Company* (New York: M.A. Johnson, 1993) p. 25.

register as lobbyists."[44] It is therefore impossible to put a figure on the number of individuals lobbying for defense contracts on behalf of General Electric.[45]

Even so, Deakin details the lobbying arrangements used by General Electric to the best of his ability. He explains that General Electric had an office in Washington headed by Laurence I. Wood, who was the company's vice president in charge of corporate affairs. Of the six employees in Wood's office, three of them were registered lobbyists. Two of these individuals dealt with General Electric's legislative work, while the third was the company's Washington counsel. General Electric also had a defense programs division located in Washington, which was responsible for coordinating the company's defense contract work. Furthermore, Deakin notes that General Electric had access to the White House through its relationships with Washington law firms. For example, the company worked with Clifford and Miller, headed by Clark M. Clifford, who was special counsel to President Truman, personal advisor to President Johnson and chairman of the C.I.A.'s Foreign Intelligence Advisory Board.[46]

Gordon Adams' *The Politics Of Defense Contracting: The Iron Triangle* elaborates on the lobbying efforts of companies seeking to earn defense contracts from the government during the 1960s and 1970s. *The Iron Triangle* focuses on revealing the lobbying operations of eight defense contractors: Boeing, General Dynamics, Grumman, Lockheed, McDonnell Douglas, Northrop, Rockwell

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[44] James Deakin, *The Lobbyists* (Washington: Public Affairs Press, 1966) p. 121.
[45] Ibid, p. 121.
[46] Ibid, pp. 121-122.

International, and United Technologies.[47] Although General Electric is not one of the companies examined in great detail by *The Iron Triangle*, the book is still a valuable source for learning about General Electric's lobbying efforts, given that General Electric surely followed the same lobbying strategies as the above mentioned defense contractors.

In a similar fashion to *The Lobbyists*, *The Iron Triangle* reveals that existing loopholes pertaining to lobbying allowed defense contractors to exert significant influence on the government without having to publicly disclose their lobbing activities. The 1946 Legislative Reorganization Act stipulated that individuals must register as lobbyists if lobbying is their "principal activity." Adams explains that many individuals who lobbied for defense contracts successfully avoided registering by claiming that lobbying was not their "principal activity." Furthermore, the 1946 Legislative Reorganization Act assumes that all lobbying efforts are directed towards Congress. However, Adams reveals that "Most registered lobbyists spend as much time and energy lobbying before the executive branch as before the legislative branch. Most lobbyists try to influence decisions at all stages." Adams concludes his discussion of lobbying by asserting that much of the lobbying activity in Washington is never disclosed to the public, and that lobbyists wish to remain hidden from the public eye. In fact, one General Electric lobbyist is quoted as saying, "Visibility is the last thing I need."[48]

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[47] Gordon Adams, *The Politics Of Defense Contracting: The Iron Triangle* (New Brunswick, NJ: Transaction Books, 1982) p. 7.
[48] Ibid, p. 135.

Thomas F. O'Boyle's *At Any Cost* offers a critical perspective of General Electric and its role in the Military-Industrial Complex. O'Boyle focuses on General Electric during the 1980s and 1990s while under the leadership of Chairman and CEO Jack Welsh. Although the United States was not fighting a full-fledged war during this period, the government continued to spend a great deal of money on defense contracts because of continuing Cold War hostilities. O'Boyle acknowledges that Welch was a very successful businessman, yet he disapproves of the manner in which Welch ran General Electric. O'Boyle claims that under Welch's guidance, General Electric was "a company where greed played a powerful role" and that the company was "managed by threat and intimidation rather than encouragement."[49]

O'Boyle reveals that during the 1980s and 1990s General Electric was guilty of more instances of Pentagon fraud than any other military contractor, and highlights lawsuits that detail illegal and unsafe practices that took place in General Electric's nuclear business.[50] O'Boyle even goes as far to say that General Electric "abandoned the old-fashioned business values that made this the American century—loyalty, trust, respect, teamwork, hard work, compassion—in a feverish pursuit of the quick buck."[51] *At Any Cost* provides valuable insight as to how General Electric functioned within the Military-Industrial Complex during the later portion of the Cold War era.

Bringing GE To Light: How General Electric Shapes Nuclear Weapons Policies For Profits is also extremely critical of General Electric's role within the

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[49] Thomas F. O'Boyle, *At Any Cost: Jack Welch, General Electric, and the Pursuit of Profit* (New York: Alfred A. Knopf, 1998) p. 15.
[50] Ibid, p. 13.
[51] O'Boyle, p. 16.

Military-Industrial Complex during the 1980s. Written by the Infant Formula Action Campaign (INFACT), a non-profit agency that aims to protect the American public from abuses committed by private corporations, *Bringing GE To Light* accuses General Electric of "promoting the nuclear weapons build-up and then producing these weapons of mass destruction at public expense for private profit."[52] INFACT claims that the leaders of General Electric have gained significant influence over decisions affecting the country's national security and that their corporate interests are hidden from the public.[53] Furthermore, the report informs readers that General Electric was proven guilty of overcharging the government on military contracts in 1985.[54]

Bringing GE To Light highlights the influence that General Electric has within the government's legislative and executive branches. INFACT cites the company's relationship with President Ronald Reagan, a former spokesmen for the company, as a way through which the company manipulates national defense policy.[55] INFACT claims that during the 1980s, under Reagan's presidency, General Electric's nuclear weapons prime contract awards increased from $2.2 billion in 1980 to $6.8 billion in 1986.[56] Furthermore, INFACT's report explains that former GE lobbyists head the Committee on the Present Danger, which "conducts public information campaigns on military issues to warn policy makers and the public of the growing Soviet military

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[52] Infant Formula Action Coalition, *Bringing GE To Light: How General Electric Shapes Nuclear Weapons Policies For Profits* (Boston: Infant Formula Action Coalition, 1990) p. vii. INFACT was founded in 1977 in response to Nestlé promotion of breast milk substitutes. *Bringing GE To Light* was the second campaign led by INFACT against a private corporation. The organization is now referred to as Corporate Accountability International.
[53] Ibid, p. vii.
[54] Ibid. p. 10.
[55] Ibid. p. 10.
[56] Ibid. p. 10.

strength and the need to match it."[57] INFACT warns the American public not to be deceived into thinking that General Electric is "simply doing a patriotic duty by providing for the national defense;" the report asserts that the power of defense contractors such as General Electric presents a legitimate threat to democracy in the United States.[58] INFACT hopes that, upon becoming aware of General Electric's efforts to inflate defense spending for its own benefit, the American public will boycott General Electric products and consequently weaken the company's influence on the government.

In the following chapters of my thesis, I cite a number of the literary works summarized above, as well as various other secondary sources. In addition, there are two primary sources of information that I rely on. The first is the *General Electric Annual Reports*, which provide yearly updates on the growth and outlook of the company. Each report contains a statement from the company's president, a balance sheet that tracks the company's sales and earnings, and a "yearbook" that highlights the achievements within each of the company's industry segments. The second source is *The General Electric Monogram*, which was published on a monthly basis specifically for General Electric managers and members of the sales staff. The *Monogram* kept these individuals updated on events within the company so that they could use the company's rhetoric when interacting with potential customers.

Both of the *Annual Reports* and *The Monogram* are published by General Electric, and therefore consistently portray a favorable image of the company. Furthermore, General Electric had particular goals in mind when publishing these

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[57] Ibid. p. 11.
[58] Ibid. p. 9.

sources, so they are no doubt biased. Even so, these two sources provide invaluable information regarding the history of the company and its role in defense production.

My detailed studies of General Electric's annual reports and *The Monogram*, as well as my review of a number of secondary sources, lead me to believe that General Electric's defense production from World War II through 1970 played an essential role in strengthening America's military and fueling the growth of the company. In terms of strengthening America's military, General Electric helped develop the atomic bomb during World War II, and later built nuclear reactors to power submarines. The company also played an important role in developing radar and missile systems, and in designing and constructing jet engines. In terms of fueling the company's growth, defense production was not only a steady source of income for General Electric, it also gave the company inroads into space research, commercial jet engine production, and the design and construction of nuclear power plants, all of which would become increasingly profitable endeavors during the 1960's.

Not surprisingly, in General Electric's rhetoric in its annual reports and *The Monogram* downplayed the importance of its defense work to the success and growth of the company. Instead, General Electric portrayed its defense production as an act of good citizenship that contributed to America's military strength and security. A more accurate portrayal, I believe, is that General Electric's defense work from World War II to 1970 benefited the American military, America's national security, and the company itself to a significant extent.

II. General Electric And The Military-Industrial Complex (WWII-1952)

During the period between the first and second World Wars, many Americans came to believe that the United States should not have participated in World War I. David Kennedy explains that "No people came to believe more emphatically than the Americans that the Great War was an unalloyed tragedy, an unpardonably costly mistake never to be repeated."[59] The United States had abandoned its principle of isolationism and sacrificed over fifty thousand soldiers in World War I in order to protect Europe from authoritarian leaders.[60] Although the Allies were victorious, Europe "swiftly slid back into its historic vices of authoritarian and armed rivalry, while America slid back into its historic attitude of isolationism."[61] To avoid another entanglement in a European conflict, the United States began to demobilize its armed forces, and Congress enacted a series of neutrality laws. While Germany and Japan developed into formidable military powers during the 1930's, the United States failed to keep pace.

Consequently, when the United States entered World War II on December 7, 1941 in response to the Japanese attack on Pearl Harbor, America had virtually no army, and American weapons were vastly inferior to the weapons of its enemies. Although the United States had made a push for rearmament after the war in Europe began in 1939, the country's military forces were still lacking. Kennedy explains that World War II mobilization was a "Herculean task after years of willful neglect of military preparedness."[62]

Fortunately, America had tremendous industrial capacity that was quickly

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[59] David Kennedy, *Freedom From Fear: The American People In Depression And War, 1929-1945* (Oxford: Oxford UP, 1999) p. 386.
[60] Ibid, p. 386.
[61] Ibid, p. 386.
[62] Ibid, p. 476.

converted from peacetime use to an unprecedented production of war machinery and weapons.[63] President Franklin Delano Roosevelt vastly increased government defense spending during World War II; in fact, the percentage of U.S. Gross National Product devoted to defense spending rose from 2% in 1939 to 42% in 1945.[64] This defense spending played an essential role in lifting the United States out of the Great Depression and remained an integral part of many states' economies in the war's aftermath.[65]

The intense collaboration among the American government, military and private enterprise that made World War II mobilization successful is what most historians identify as the beginning of the Military-Industrial Complex in the United States.[66] Following the war's conclusion, this collaboration continued because of the threat posed by the Soviet Union and the ensuing Cold War. In the immediate post-World War II era, President Harry Truman partially demobilized the American military and significantly reduced the nation's defense budget.[67] Truman also set in motion the Marshall Plan to rebuild Europe, as well as the strategy of containment, which he hoped would help to maintain a global balance of power with the Soviet Union.[68] Truman believed the Marshall Plan and the containment strategy provided an economic approach to dealing with the potential threat of the Soviet Union rather than using military force.[69] Truman argued that "Only a national emergency could justify a major escalation of U.S. defense

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[63] Stuart Brandes, *Warhogs: A History Of War Profits In America* (University Of Kentucky Press, 1997) p. 250.
[64] David B. Woolner, Warren F. Kimball, and David Reynolds, *FDR's World: War, Peace, And Legacies* (New York: Palgrave Macmillan, 2008) p. 84.
[65] Susan Welch, John Gruhl, John Corner, and Susan M. Rigdon, *Understanding American Government* (Boston: Wadsworth/Cengage Learning, 2008) p. 59.
[66] Kennedy, p. 647.
[67] Michael J. Lacey, *The Truman Presidency* (New York: Cambridge University Press, 1989) p. 209.
[68] Ibid, p. 267.
[69] Ibid, p. 267.

spending."[70]

Truman continued to restrain defense spending until 1950, when he reversed course for two reasons. The first was North Korea's invasion of South Korea, and the second was heightened concern over Soviet Union's emergence as a nuclear superpower.[71] Even so, Truman was reluctant to drastically increase defense spending; he "favored a gradual and balanced military buildup, stressing defense mobilization capabilities over standing forces."[72] Ultimately, however, Truman and his administration became convinced that it was necessary to develop even more sophisticated and powerful nuclear weapons and delivery systems to deter a Soviet nuclear attack.[73] General Electric and various other large defense contractors played important roles in developing these weapon systems as well as conventional weapons used in the Korean War.

This chapter examines General Electric's defense work and the spillover effects of defense research on the company's commercial production from World War II through 1952. During World War II, General Electric became primarily a defense contractor, and the United States government remained a staple of General Electric's business in the immediate post-war era. This defense work and its spillover effects helped to facilitate the company's transition to a peacetime economy. Most significantly, the government entrusted General Electric with a key role in developing peacetime uses of atomic energy, which was an extension of the company's work on the Manhattan Project.

At the outset of the 1950s, the Korean War and Cold War rearmament necessitated an increase in defense mobilization. In order to serve the government, the

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[70] Ibid, p. 230.
[71] Ibid, p. 233.
[72] Ibid, p. 216.
[73] Ibid, p. 233.

military, and its shareholders, General Electric's defense production and research increased dramatically between 1950-1952. General Electric championed its defense production through advertisements and company publications, and portrayed itself as a selfless company doing its part to protect national security.

I believe that from World War II through the early 1950s, a close relationship existed between the government, military, and General Electric in which all three parties greatly benefited from one another. General Electric, in particular, experienced substantial growth during World War II because of its defense business. General Electric glorified the importance of its defense work in company publications, but resisted accusations that its defense work provided the company with great profits. Then, during the post-war period, General Electric continued to work on defense projects, but more importantly was able to develop new peacetime products and services based on technology acquired in its defense work.

In order to present my analysis in an organized manner, I have divided the remainder of this chapter into four sections. The first section will briefly address General Electric's role in World War II and how the war affected growth of the company. The second section will detail the company's conversion to a peacetime economy. The third section will focus on General Electric's role in studying atomic energy as well as the additional research it performed on behalf of the government. The fourth and final section describes General Electric's role in defense mobilization between 1950 and 1952.

World War II's Effect on General Electric

During World War II, General Electric dedicated all of its facilities, production, and research to defense mobilization.[74] Consumer and industrial products were put on hold during this period so that full attention could be given to the war effort. General Electric embraced the vital role it played in defense production between 1939 and 1945. In an article appearing in the *Monogram* in 1945, General Electric President Charles E. Wilson explains that Japan surrendered in World War II in part because of the "superior scientific and productive power of the United States and her allies."[75] Wilson attributed the power of the United States in these two areas to "the hard work of countless men and women who never heard a shot fired," many of whom worked for General Electric.[76]

Contracts between the United States government and General Electric during World War II provided the company with millions of dollars for defense production. General Electric's sales quadrupled, going from $342 million in 1939 to $1.38 billion in 1945.[77] Given the deep involvement of General Electric in defense production during World War II, it was assumed by many that the company had accumulated enormous profits from this work. Stuart Brandes explains that it was exceptionally complicated for government agencies to prevent corporations such as General Electric from profiting during World War II: "Restriction of war profits proved to be a problem capable of thwarting the best efforts of the nation's most able and committed economic planners."[78] Although the Roosevelt administration went too great lengths to restrict war profits,

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[74] "To The Stockholders of the General Electric Company," *1945 Annual Report And Yearbook*, p. 9.
[75] "Memo: To Ourselves," *The General Electric Monogram*, 1945.
[76] Ibid
[77] "15 Year Summary,"*1953 Annual Report And Yearbook*, p. 33.
[78] Brandes, p. 250.

Brandes concludes that, "the average defense contractor prospered considerably during the war, and some prospered enormously.[79] However, the Roosevelt Administration's anti-profiteering campaign was successful in the sense that it prevented the level of profiteering reached during World War I.

In the case of General Electric, its sales greatly increased during World War II, but the company denied that it earned significant profits through its wartime production. An article appearing in *The Monogram* from 1946 explains that although General Electric's revenue increased throughout most of the war, there were twice as many employees to be paid, more supplies to purchase, more taxes to pay, and higher depreciation resulting from additional capital investments.[80] The article claims, "After all these payments were made, the Company wound up with very little left to take care of future needs."[81] General Electric clearly wanted to avoid backlash that defense contractors were subjected to in the post-WWI era for unfairly profiting from defense production.

Reconversion

Following the conclusion of World War II in September 1945, with the surrender of the Japanese forces, the United States looked to transition to a peacetime economy. Debate raged as to whether wartime price controls, which had been instituted to guarantee that essential goods could be purchased at a reasonable price, should be extended into the post-war era. Lizabeth Cohen explains in *A Consumer's Republic: The Politics Of Mass Consumption In Postwar America* that the vast majority of the public

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[79] Ibid, pp. 264-265.
[80] "What Happened To GE's Wartime Income," *The General Electric Monogram*, 1946.
[81] Ibid

was in favor of extending price controls until at least June of 1947.[82] Even so, price controls were lifted on June 30, 1946, meaning that price ceilings and rent control would no longer be applicable.[83] In the ensuing month, food prices as well as overall living expenses significantly increased, which led to mass protests across the country against higher prices.[84]

Thus, the government effectively decided that it would not be regulating market activities as the American economy entered the period of reconversion during the latter half of 1946.[85] The removal of price controls had significant implications for General Electric. Given that food prices and overall living expenses substantially increased, customers might be less inclined to purchase consumer goods placed on the market by General Electric. Further, the inflationary impact of lifting price control could increase the company's costs of production, including the wage demands of its employees.

The majority of companies that aided the United States government and military through defense production during the war began their reconversion to a peacetime economy with the surrender of Germany in early May of 1945. However, General Electric could not fully begin the process of reconversion until the war was completely over.[86] As stated in an advertisement from the *Monogram*, many General Electric scientists and engineers were "engaged until final victory in finding ways to counteract new weapons which Japan may devise and also in creating new devices for our own

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[82] Lizabeth Cohen, *A Consumer's Republic: The Politics Of Mass Consumption In Postwar America* (New York: Alfred A. Knopf, 2003) p. 102.
[83] Ibid, p. 103.
[84] Ibid, p. 103.
[85] Ibid, p. 109.
[86] "How Does General Electric Stand On Reconversion," *The General Electric Monogram*, June-July, 1945.

armed services."[87] For example, General Electric scientists were still working on developing an atomic bomb for the Manhattan Project.

In preparation for reconversion to a peacetime economy, General Electric established a Reserve between 1942-1944 holding upwards of $15 million dollars.[88] Realizing that reconversion would be an expensive and painstaking process, General Electric anticipated losses in earnings in the months following the conclusion of World War II.[89] The Reserve was established in order to provide a source of funds that could be drawn on during this difficult period.

Although losses were predicted due to reconversion, General Electric hoped that there would be high demand for its industrial and consumer goods in the immediate post-war economy. Many of the industrial and consumer goods that had been sold by General Electric prior to World War II were wearing down and in need of replacement.[90] Despite the higher prices resulting from the removal of price controls, Americans were eager to rebound from the Depression and participate in the consumer market. General Electric believed that pent-up demand would lead to great sales in the immediate post-war era and consequently help the company make a smooth transition into the peacetime economy.[91] Cohen explains that mass consumption in the postwar era was commonly viewed as "a civic responsibility designed to provide full employment and improved living standards for the rest of the nation."[92]

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[87] Ibid
[88] "To The Stockholders of the General Electric Company," *1945 Annual Report And Yearbook,* p. 13.
[89] Ibid
[90] "The Postwar Demand For Industrial Goods Will be Great," *The General Electric Monogram,* 1945.
[91] Ibid
[92] Cohen, p. 113.

General Electric began advertising its new consumer products in 1945 even before World War II officially concluded. The company advertised its products as improving standards of living and making life more enjoyable in order to attract customers. For example, an advertisement from the 1945 edition of the *Monogram* explains that General Electric products such as lamps, x-rays, and air conditioning are helping people stay healthy.[93] A second advertisement from the 1945 edition of the *Monogram* highlights the importance of electricity to farms, which of course are responsible for producing the food that people need to survive.[94] General Electric continued these marketing techniques throughout the immediate post-war era.

General Electric could not meet the production schedules it had set for itself during the final quarter of 1945, attributing its inability to create the desired quantity of domestic goods to difficulties resulting from reconversion.[95] The company could not obtain materials and component parts from suppliers at a fast enough rate, and was lacking in overall efficiency.[96] Fortunately for General Electric, the United States government aided General Electric during this difficult period. General Electric received $21.5 million in post-war tax refund bonds, and an additional $127 million in contract termination claims from the government.[97] Although the defense orders received by General Electric in 1945 were only half of the number received in 1944, the company managed to conclude 1945 with earnings and surplus relatively equal to those of 1944.[98]

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[93] "Helping The Sick Get Well," *The General Electric Monogram*, 1945.
[94] "So You'll Eat Better," *The General Electric Monogram*, 1945.
[95] "To The Stockholders of the General Electric Company," *1945 Annual Report And Yearbook*, p. 9.
[96] Ibid, p. 9.
[97] Ibid, p. 11.
[98] Ibid, p. 3.

The conclusion of World War II had a substantial effect on General Electric employees. Due to the cancellation of war contracts, there were fewer employment opportunities in the company in the immediate post-WWII era. The result was a 14% decrease in the number of General Electric employees at the end of 1945.[99] According to General Electric's 1945 annual reports, many female employees resigned from their positions once WWII ended because they wished to return to their prewar occupations.[100] Returning war veterans ultimately filled many of the positions made available by these women.[101]

General Electric predicted that much of the technology it developed during World War II could be applied to the creation of peacetime products. Cohen explains that because the government favored a mass consumption-driven economy in the immediate postwar era, companies like General Electric were able to "facilitate the transfer of government-funded research from military to consumer applications."[102] In this sense, a spillover of military technology increased the company's ability to create state-of-the-art consumer products. For example, an advertisement from the 1945 edition of the *Monogram* explains that air conditioning equipment has become "more compact, more flexible, and more efficient" as a result of the company's research during World War II.[103] Specific products that General Electric planned to produce for consumer and industrial use in the immediate post-war era were air conditioning, electric blankets, gas turbines, wire recorders, televisions, plastics, automatic washing machines, dish washers,

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[99] Ibid, p. 24.
[100] Ibid, p. 25.
[101] Ibid, p. 25.
[102] Cohen, p. 118.
[103] "Helping You Sleep Better," *The General Electric Monogram*, 1945.

germicidal lamps, silicone rubber, aircraft instruments, fluorescent lamps, and industrial electronic devices.[104]

General Electric's production problems continued in 1946 for two primary reasons. First and foremost, inflation caused by the lifting of price controls at the conclusion of World War II caused many General Electric employees to go on strike in January.[105] The United Electrical Workers represented General Electric employees as well as electrical workers from two of the company's fiercest competitors, Westinghouse and General Motors.[106] According to Kim Phillips-Fein, the author of *Invisible Hands*, "The union was demanding a two-dollar-a-day raise for all workers, a goal that its leaders had determined in industry-wide meetings would help to make up for the wage restraint of the war years."[107] General Electric failed to meet this demand, and hundreds of thousands General Electric employees consequently went on a nine-week strike.[108] Although General Electric believed that it was paying its employees fair wages, the company reluctantly gave in to the demands of the striking employees and increased hourly wages by eighteen-and-a-half cents (an increase of $1.50 per day).[109]

The second production problem faced by General Electric was its inability to meet consumer and industrial demand.[110] Great innovation during the war years and in 1946 resulted in many new products being available to the public. For example, General Electric now offered automatic washing machines and dishwashers to consumers, along

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[104] "GE Jobs Based On Man Inventions," *The General Electric Monogram*, 1945.
[105] Ronald W. Schatz, *The Electrical Workers: A History of Labor At General Electric and Westinghouse, 1923-1960* (Urbana, Illinois: University of Illinois, 1983)
[106] Kim Phillips-Fein, *Invisible Hands: The Making Of The Conservative Movement From The New Deal To Reagan* (New York: W.W. Norton & Company, 2009) pp. 94-95.
[107] Ibid, p. 95.
[108] "To The Stockholders of the General Electric Company," *1946 Annual Report And Yearbook*, p. 5.
[109] Phillips-Fein, p. 97.
[110] "To The Stockholders of the General Electric Company," *1946 Annual Report And Yearbook*, p. 6.

with motors that powered mining and oil-drilling machinery.[111] As a result General Electric's production did expand in 1946, but consumer and industrial demand surpassed General Electric's supply of these goods.

Wage and salary increases for employees coupled with the company's inability to meet pent-up consumer demand had a detrimental effect on General Electric's earnings for the year. While wages increased 55.1% during the wartime period, the prices of General Electric's products only increased by 18%.[112] General Electric's sales in 1946 were only half of its sales in 1945, causing a significant reduction in the company's net earnings, which were the lowest they had been since the Depression.[113]

In 1947 General Electric was able to recover from its poor year of sales the previous year. The company considered 1947 to be its "first representative post-WWII year", for by the end of the year it had been given a sufficient amount of time to reconvert to the peacetime economy. Sales in 1947 were double those of 1946, and income from these sales amounted to over $145 million and the earnings were also more than double those of 1946.[114] These positive trends continued in 1948 and 1949. Sales increased by $300 million from 1947 to 1948, and earning increased by $28 million.[115] Sales and earnings in 1949 were very similar to those of 1949.[116]

General Electric's annual reports during this period emphasizes the company's dedication to its employees and the American consumer as well as the heavy tax burden placed on the company. The 1947 annual report states that, in an effort to prevent

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[111] "Yearbook For 1946," *1946 Annual Report And Yearbook,* pp. 27-28.
[112] "To The Stockholders of the General Electric Company," *1946 Annual Report And Yearbook,* p. 9.
[113] Ibid, p. 9.
[114] "General Electric Company and Affiliates Consolidated Statement Of Income And Earned Surplus," *1947 Annual Report And Yearbook,* p. 15.
[115] "Highlights Of 1948," *1948 Annual Report And Yearbook,* p. 2.
[116] "Highlights Of The Report," *1949 Annual Report And Yearbook,* p. 2.

inflation, the prices of General Electric consumer products only increased half as much as all manufactured products between 1940 and 1947.[117] This annual report also stressed the importance of selling products that would improve American lives at an affordable price. In addition, it pointed out that record highs were reached in 1947 for the number of employees on the payroll as well as their average weekly earnings.[118] Finally. the 1947 annual report claims that a social responsibility of General Electric was, "to enable management to learn how to become as successful in providing jobs which satisfy the employees as the Company has been in supplying products which satisfy its customers."[119]

General electric's 1948 annual report maintains that earnings for that year could have been substantially higher had government taxes not been significantly increased. The annual report explains, "Federal, state, and local government agencies will collect, in the form of all kinds of taxes for the year, a sum nearly one and one half times the amount of the Company's earnings."[120] However, to put things in perspective, the taxes imposed upon General Electric in 1948 were not nearly as high as the taxes imposed during World War II. Continuing the theme of General electric's dedication to the American consumer, the 1948 annual report also claims that the company further decreased the prices of its products in 1948 not only to save American consumers money, but also because it wanted to set an example to other companies that increasing prices would lead to inflation.[121]

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[117] "To The Stockholders," *1947 Annual Report And Yearbook,* p. 5.
[118] Ibid, p. 7.
[119] Ibid, p. 9.
[120] Ibid, p. 3.
[121] Ibid, p. 14.

Research for Government

Although World War II concluded in 1945, General Electric continued production, research and development on behalf of the government in the immediate post-war era. General Electric scientists had made significant contributions to the production of the atomic bombs dropped on Hiroshima and Nagasaki, and both the government and General Electric wanted the company to continue its exploration of atomic energy for peacetime and military use. According to Brian Balogh, author of *Chain Reaction,* the scientists who worked on the Manhattan Project were "The most forceful advocates of the development of civilian nuclear power because they were the very scientists who had been directly involved in its development and had placed it on the agenda in the first place."[122] Some of the scientists were no doubt employees of General Electric.

The most important governmental project ultimately given to General Electric during this period was the study of atomic energy. The dual purpose of atomic energy research was to continue the production of nuclear weapons and also to find ways that atomic energy could be used to generate power for practical purposes. Balogh explains that the government was intrigued by the possibility of using atomic energy for civilian purposes.[123] He observes, "A massive wartime effort inadvertently created a technology that might prove to be of great social and economic value."[124] In response to the government's call for research in atomic energy, General Electric's 1946 annual report

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[122] Brian Balogh, *Chain Reaction: Expert Debate And Public Participation In American Commercial Nuclear Power, 1945-1975* (Cambridge: Cambridge University Press, 1991) p. 65.
[123] Ibid, p. 64.
[124] Ibid, p. 64.

claims, “The entire scientific, engineering, and manufacturing facilities of the Company will be drawn upon to further the atomic power project.”[125]

In the summer of 1946, General Electric became responsible for Hanford Engineer Works, which was a $350 million project based in Washington.[126] Hanford Works was established in 1943 by decree of the government as part of the Manhattan Project. Under the guidance of the United States Army Corps of Engineers, the primary objective of Hanford Works was to produce plutonium that could be used in an atomic bomb. At the conclusion of World War II, General Electric was entrusted by the government to operate “an extensive program for atomic energy research and development” at Hanford Works. The contract agreed to between General Electric and the government was a cost-plus-$1-fee contract, meaning that General Electric would be compensated for all expenses but not earn any direct profit.[127] Nonetheless, the company stood to benefit significantly from the research conducted at Hanford Works by using this research in furtherance of its effort to develop a nuclear power plant

Additionally, General Electric announced in November of 1946 that it had been chosen to operate a $20 million government laboratory that would be built in order to explore atomic energy.[128] Schenectady, New York was selected as the site for the government laboratory, which was to be called the Knolls Atomic Power Laboratory.[129] According to an article from the *New York Times* on November 10, 1946, the Knolls Atomic Power Laboratory was the “fourth institution designed (by the government) to

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[125] “Yearbook,” *1946 Annual Report And Yearbook*, p. 23.
[126] Ibid, p. 23.
[127] John A. Miller, *Men and Volts at War; The Story of General Electric in World War II* (New York: McGraw-Hill Books, 1947) pp. 229-232.
[128] “Yearbook,” *1946 Annual Report And Yearbook*, p. 23.
[129] Ibid, p. 23.

convert the power of the fissioned atom into uses beneficial for mankind."[130] Although not directly acknowledged in the 1946 annual report, Knolls Atomic Power Laboratory was designed to explore atomic energy for defense purposes as well as for power generation.

General Electric's 1947 annual report hinted that the company was well on its way to building a nuclear power plant that could generate electrical energy. Although scientists and engineers still had many significant hurdles to overcome, General Electric claimed, "the production of power from atomic energy power plants is possible within the reasonably near future."[131]

Research and development in other areas also became increasingly important to General Electric in 1947. The 1947 annual report states, "General Electric's research activities, which are the foundation for the Company's products and services, are being carried on more intensively than ever before."[132] General Electric claimed that its most influential laboratory was the General Engineering and Consulting Laboratory, located in Schenectady, NY. General Electric had a long tradition of success in research and development, and believed that it was fundamental to the growth of the company. The intensified level of research and development by the company continued throughout the remainder of the immediate postwar era, with much of it directed towards defense purposes.

The General Engineering and Consulting Laboratory continued research on behalf of the Army Ordnance Department in 1946 by performing research on guided missiles as

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[130] "New Research Set On Atomic Power," *New York Times* November 10, 1946.
[131] "Yearbook," *1947 Annual Report And Yearbook*, p. 26.
[132] Ibid, p. 26.

well as rocket and jet engines.[133] Additional contracts signed in 1947 between General Electric and the government provided funding for research on weather modification and guided missile design for the benefit of the military.[134] Together with the atomic research activities described above, these contracts provide evidence that close relations continued to exist between General Electric, the government, and the military in the immediate post-WWII era. Even during this time of peace, General Electric devoted significant facilities and manpower to defense work.

General Electric made several major announcements in the field of atomic research in 1948 and 1949. In March of 1948 General Electric created a Nucleonics Department to operate the facilities at Hanford works, "where a tremendous physical expansion is underway."[135] The company's 1949 annual report stated that the primary objective of the Knolls Atomic Power Laboratory, which was nearing completion, would be to design the first nuclear reactor power plant.[136] This laboratory was completed in 1950, General Electric was able to significantly boost its atomic research on behalf of the government. The Knolls Atomic Power Laboratory immediately went to work helping the Hanford Works produce plutonium. General Electric also revealed in its 1950 annual report that General Electric research facilities had been creating "small amounts of atomic energy since April, 1948."[137]

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[133] "Yearbook," *1946 Annual Report And Yearbook*, p. 25.
[134] Ibid, p. 27.
[135] "Yearbook," *1948 Annual Report And Yearbook*, p. 23.
[136] "Yearbook," *1949 Annual Report And Yearbook*, p. 22.
[137] "Yearbook," *1950 Annual Report And Yearbook*, p. 23.

Defense mobilization

The Korean War and Cold War rearmament necessitated an increase in defense production that began in 1950. Following the conclusion of World War II, the United States became increasingly wary of the Soviet Union. The Soviet Union emerged as a world superpower along with the United States in large part because Soviet scientists were able to develop nuclear weapons. Daniel Kelves explains, "The Soviet Union was perceived as threatening the West with armed aggression—a challenge that demanded not only a major and immediate increase in military strength but, perhaps, an even larger boost in defense research and development."[138] In response to this perceived aggression, the United States National Security Council proposed NSC-68 in April of 1950, which recommended that the United States significantly increase its military peacetime spending.[139] President Harry Truman used the invasion of South Korea by communist North Korea as an impetus for adopting NSC-68.[140]

Just as it had during World War II, the government called upon General Electric to be a major contributor in defense mobilization for the Korean War. General Electric claimed that it was natural for the United States government to call on the company for defense production. The 1950 annual report explains, "The very nature of modern military needs makes it inevitable that an organization with the skill, experience and facilities that are brought together within General Electric will be heavily involved in the nation's defense program."[141]

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[138] Daniel Kelves, "K1S2: Korea, Science, And The State," *Big Science: The Growth of Large-Scale Research* (Stanford: Stanford UP, 1992) p. 320.
[139] Ernest R. May, *American Cold War Strategy: Interpreting NSC 68* (Boston: Bedford of St. Martin's, 1993) p. 32.
[140] May, p. 156.
[141] "To The Stockholders," *1950 Annual Report And Yearbook*, p. 3.

During the five-year period between the conclusion of World War II and the beginning of the Korean War, 10% to 15% of General Electric's business was in the defense industry.[142] General Electric justified its continued role as a defense contractor in the 1950 annual report, saying, "Because electric power and electrical products for industry are so essential, General Electric, in a very real sense, is at all times engaged in the business of producing for defense."[143]

As a result of Korean War contracts, the percentage of General Electric's defense work rose to 20% of its business, with 80% of its business remaining in non-defense areas.[144] Thus, unlike World War II, General Electric continued its production of peacetime industrial and consumer goods. This was possible because of the smaller scale of the Korean War, which meant that General Electric did not have the same set of wholesale restrictions on production as it did in World War II. General Electric asserted that defense mobilization took precedence over the production of peacetime goods, yet the continued production of peacetime goods was essential for the American population and the growth of the company.[145] In this sense, General Electric needed to find a balance between contributing to defense mobilization and producing peacetime goods.

Advertisements appearing in *Life Magazine* shed light on how General Electric perceived its defense production during the Korean War. These advertisements reiterate the idea that General Electric and the government worked hand in hand to provide defense materials for the military. Furthermore, each advertisement explains how General Electric's advanced technology is supporting American troops fighting in Korea.

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[142] Ibid, p. 4.
[143] Ibid, p. 3.
[144] Ibid, p. 4.
[145] "Yearbook," *1950 Annual Report And Yearbook*, p. 22.

Two defense areas in which General Electric specialized were in jet production and military electronics. In an advertisement appearing in the November 1952 edition of *Life*, General Electric explains that a company engine powers the Air Force's new "Sabre" jet plane. The advertisement concludes, "The flow of finished G-E jets to your Air force is getting bigger every day. Thus, G-E engineering research helps keep America's air defense strong."[146] An advertisement appearing in the April 1952 edition of *Life* glorifies General Electric's contribution to military electronics by intertwining the company's work in this field with its industrial electronics work. The advertisement states, "G-E scientists are helping to make military and industrial electronics America's strongest weapons in war and peace. In these fields, as in television, radio, and all other phases of electronics, you can look to General Electric for leadership."[147]

Defense work appears to have been largely responsible for increases in General Electric's sales and net earnings in 1950. Although the company was able to make improvements in commercial sales in 1950, the most drastic gains were made in its defense sales. After increasing its defense production in 1950, General Electric earned over $346 million in 1950 from "income from operations" in comparison to the $188 million it made in 1949.[148]

The 1950 annual report predicted that General Electric would be devoting 35% of its business to the defense industry in 1951.[149] Furthermore, General Electric was prepared to convert a portion of its consumer and industrial manufacturing facilities to

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[146] "New G-E Engines Strengthen Defense Screen," *Life Magazine*, November, 1952. p. 95.
[147] "Your Security And Well-Being Strengthened By G-E Electronics Research In 3 Great Laboratories," *Life Magazine*, April, 1952. p. 1.
[148] "Consolidated Statement Of Earnings," *1950 Annual Report And Yearbook*, p. 15.
[149] "To The Stockholders," *1950 Annual Report And Yearbook*, p. 4.

defense products.[150] However, the company's defense business remained at 20% in 1951 and barely any manufacturing facilities underwent significant alterations for defense production.[151]

General Electric's net earnings in 1951 were $35 million less than in 1950, and according to the company, the United States government was largely responsible for this drop in earnings. As a result of the Korean War, the government set limits on General Electric's prices, wages and salaries, and also drastically increased taxes. The 1951 annual report explains, "With federal taxes having taken 67 cents out of every dollar of the Company's pretax earnings last year, as against 53 cents in 1950, the remaining net profit was 20 per cent less than was earned in the preceding year." General Electric acknowledged that the country was in the midst of a national emergency, yet it was unhappy with how the government's policies affected the company's earnings. In the 1951 annual report, General Electric representatives went as far as to claim "the remaining profit (after taxes in 1951) is inadequate to satisfy the actual requirements of the business during this period of inflation."[152]

The sharp increase in defense production that had been predicted for 1951 occurred in 1952. General Electric's total sales rose to $2.62 billion in 1952, and defense production accounted for 30% of gross sales. General Electric admitted that its accelerated defense production was one of the most important factors in increased sales. The 1952 annual report highlights the benefits to General Electric from its involvement in defense production: "Your company's heavy engagement in defense work promises

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[150] Ibid, p. 4.
[151] "To The Share Owners," *1951 Annual Report And Yearbook*, p. 6.
[152] "Highlights of 1951" and "To The Share Owners," *1951 Annual Report And Yearbook*, pp. 2-4.

substantial future business both in the continuation of its present assignments and in possible outgrowths from them." Government taxes dropped slightly in 1952, and as a result earnings increased for General Electric.[153]

The link between American government and General Electric in the form of Charles E. Wilson no doubt impacted General Electric's role in defense production, both during World War II and in the post-war era. Wilson served as President of General Electric from January 1, 1940 to September 18, 1942, but left his position in order to join the War Production Board as executive-vice chairman.[154] Wilson regained his position as President of General Electric during the final year of World War II, only to leave the company in late 1950 to become the head of the Office of Defense Mobilization.[155] An article appearing in *Life Magazine* from January 1951 describes the enormous power that Wilson had while working as the head of the Office of Defense Mobilization. According to *Life Magazine*, President Truman gave Wilson "the most sweeping authority ever granted to a U.S. citizen other than the President himself."[156] Wilson serves as a classic case of the Military-Industrial Complex; he held high positions within the government and General Electric, and clearly had the power to influence the government's issuing of defense contracts.

I believe that General Electric, the United States government, and its military each benefited significantly from their relationship from World War II through 1952. General Electric's defense production played an important role in supplying the military during

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[153] "The Year In Brief 1952" and "Letter From The President," *1952 Annual Report And Yearbook*, pp. 2-4.
[154] "Two Giant Steps: Wilson and Eisenhower Are Given Key Jobs," *Life Magazine* January 1, 1951. p. 16.
[155] Ibid, p. 16
[156] Ibid, p. 16.

World War II and the Korean War. Further, the government benefited from the revenue it accumulated through federal taxes placed on General Electric's income.

In return, revenues from defense contracts caused General Electric to double in size during World War II, and then helped the company transition to a peacetime economy when the war ended. Between the conclusion of World War II and 1952, General Electric had invested an astounding $650 million in plant modernization and expansion; this could not have been accomplished without the aid of government contracts.[157] Much of General Electric's success as a company during World War II and the post-war era between through 1952 should be attributed to defense production on behalf of the United States government and military.

[157] "Letter From The President," *1952 Annual Report And Yearbook*, p. 4.

III. General Electric And The Military-Industrial Complex (1953-1961)

The following chapter focuses on General Electric's relationship with the United States government and military between 1953 and 1961. Just as it did in the immediate post-WWII era, General Electric continued to be heavily involved in work under government contracts. The company explored uses of atomic energy for both civilian and military purposes, and maintained a relatively high rate of defense production. Furthermore, the government backed General Electric's newly formed Space Systems Division. General Electric, the government, and the military continued to greatly benefit from working hand in hand with one another.

However, General Electric's attitude towards defense production appears to have changed between 1953 and 1961. Following the conclusion of the Korean War (July 1953), General Electric stated in company publications that it wished to turn its primary focus to consumer and industrial production. Although defense sales may have been slightly less profitable than consumer and industrial sales, I believe that defense work continued to be vital to General Electric's stability and growth. Between 1953 and 1961, there appears to be a direct correlation between the company's overall sales/earnings and defense sales. Additionally, government contracts for atomic research allowed General Electric to become the leader in this field and also strengthened national defense.

General Electric's defense work from 1953 to 1961 was impacted to a significant extent by President Eisenhower's defense budget. Eisenhower was "instinctively cautious about permitting a rapid expansion in defense spending," and believed that reducing the country's defense spending would actually enhance America's strength in competition with the Soviet Union. Rather than increasing the defense budget, Eisenhower stressed

the importance of modernization through scientific research. As a result, federal spending on defense decreased as a percentage of the country's GNP, and a larger portion of the defense budget was spent on scientific research and development during Eisenhower's presidency.[158] Eisenhower's revolutionary approach to defense spending came to be known as the "New Look" strategy, which was described as "in simplest terms, an explicitly nuclear defense."[159]

In accordance with the "New Look" strategy, General Electric directed much of its atomic research to military applications. For example, the company sought to build nuclear reactors for submarines, and explored the possibility of a nuclear powered jet. However, General Electric also made significant gains in its research on atomic energy as a source of electrical power during this period. The civilian aspect of General Electric's research on atomic power helped to lay the foundations for the company's future commercial business in nuclear power. In this sense, General Electric's research on atomic power during this era had large implications for the country's defense and the commercial business of nuclear power.

This chapter will be divided into two sections. The first section will follow General Electric from 1953 to 1956 and the second will examine the company from 1957 to 1961. Each section will include three subsections: General Electric's overall growth, developments in atomic energy, and developments in national defense.

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[158] James T. Patterson, *Grand Expectations: The United States, 1945-1974* (New York: Oxford University Press, 1996) p. 289.
[159] Richard A. Melanson and David Mayers, *Reevaluating Eisenhower: American Foreign Policy In The 1950s* (University of Illinois Press, 1988) pp. 243-244.

Overall Growth (1953 to 1956)

At the outset of 1953, the United States was still actively fighting against communist forces in the Korean War. As a result, General Electric continued its elevated defense production on behalf of the United States government and military. Furthermore, the company's research and development on defense products helped the United States to maintain its leadership in defense technology. Asked why General Electric was so heavily engaged in defense production in March of 1953, Walter C. Heckman, General Manager of the Aeronautic & Ordnance Systems Division, responded "Basically, because we are a good, corporate citizen. I think that best describes General Electric's attitude. We're dedicated to the job of helping America maintain its defense leadership."[160] There is no indication in Heckman's comments that General Electric's defense production is benefiting the company. Instead, Heckman is implying that General Electric's continued involvement in the defense industry is solely based on public spiritedness.

The Korean War concluded in late July of 1953 with the signing of an armistice that reestablished the border between North and South Korea. How would the end of the Korean War affect General Electric, especially since over 30% of the company's sales had been to the defense department by the end of the war? John W. Belanger, vice president of the Defense Products Group, did not see the Korean truce impacting defense activities in the near future.[161] When asked in mid-August, Belanger asserted that General Electric's defense contributions needed to continue "because of the need to keep our nation out in front of potential enemies."[162] In this sense, Belanger was advocating

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[160] "Sales for Defense -- by A&OS," *The General Electric Monogram*, March, 1953. p. 20.
[161] "Belanger Sums It Up," *The General Electric Monogram*, August, 1953. p. 1.
[162] Ibid, p. 2.

for General Electric to be permanently engaged in defense work on behalf of the government.

The year 1953 was widely successful for General Electric. Sales and earnings both increased from 1952 to 1953 (19% and 9% respectively), as did sales in the Defense Products Group (up 28% over 1952).[163] Had it not been for "excess profits" taxes imposed by the government, these percentages would have been even higher.[164] The 1953 annual report admits that increases in the company's sales and earnings must partially be attributed to growth in defense sales.[165] However, the report states, "defense business—which the Company always stands ready to undertake for our Government—is less attractive from an earnings standpoint than our regular commercial business."[166]

This and other statements in the 1953 annual report reveal that General Electric was looking to head in a new direction as it entered 1954. Sales of defense materials dropped during the last quarter of 1953, and the annual report predicted that these sales would continue declining to the point where defense production represented only 20% of the company's business.[167] Once the defense business declined, General Electric planned to focus more of its attention on developing commercial products through research and development in its commercial business. The 1953 report states, "Your management believes that there has been no more important activity than research and development in contributing to past growth and insuring the Company's future progress."[168]

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[163] "Highlights of 1953" and "Financial Review," *1953 Annual Report And Yearbook,* p. 2 and 23.
[164] "Financial Review," *1953 Annual Report And Yearbook*, p. 23.
[165] Ibid, p. 23.
[166] "The President's Letter," *1953 Annual Report And Yearbook,* p. 5.; "GE Sales for 1953 Establish All-Time Record," *Schenectady Gazette*, March, 1945.
[167] "The President's Letter," *1953 Annual Report And Yearbook,* p. 5.
[168] Ibid, p. 5.

General Electric's desire to reduce its defense production and focus on developing the commercial aspect of its business is consistent with President Eisenhower's defense spending. Following the conclusion of the Korean War in July of 1963, Eisenhower immediately reduced the defense budget by $5 billion.[169] The President was an anti-communist Cold Warrior who believed in the importance of having a strong military. However, Eisenhower was convinced that it was necessary to hold the line on the defense budget because he believed that excessive defense spending was unhealthy for the American economy.[170] Although Eisenhower was berated by the Democratic Party, press, and military for cutting the government's defense budget, he insisted that it was in the best interest of the country.[171] General Electric's defense work slowly declined with Eisenhower's decreasing defense budget from 1954-1956.

From an earnings perspective, 1954 was by far the most successful year in company history. As expected, defense production slowly declined while research and production in commercial fields increased. However, the primary reason for the company's record earnings was that the government did not impose federal excess profit taxes in 1954, which saved General Electric at least $50 million dollars.[172] Earnings remained stable in 1955 and 1956, and the company's defense business leveled off to approximately 20% of total sales.[173]

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[169] E. Bruce Geelhoed and Anthony O. Edmonds, *Eisenhower, Macmillan, And Allied Unity, 1957-1961* (New York: Palgrave Macmillan, 2003) p. xxx.
[170] Melanson and Mayers, p. 243.
[171] Geelhoed and Edmonds, p. 154.
[172] "Consolidated Statement of Financial Position," *1954 Annual Report And Yearbook*, p. 29.
[173] "Financial Highlights of 1956," *1956 Annual Report And Yearbook*

Atomic Energy Developments (1953-1956)

General Electric indicated in 1953 that it was on the verge of achieving its goal of finding effective peacetime applications for atomic energy. Vice President of Engineering H.A. Winne stated in March of 1953 that "we (GE) are just on the threshold of peacetime uses of atomic energy with a long and difficult corridor stretching out ahead of us."[174] Winne anticipated that a nuclear power plant could be built in the foreseeable future, but noted that there were still significant problems to be solved. Winne admitted that atomic energy would likely never replace oil or gas as fuel; instead, it would supplement these conventional fuels.[175] Winne also said the most likely military application for atomic energy that General Electric would focus on was the development of a power source for submarines, noting that "the initial fuel charge would be sufficient to permit the submarine to operate for a number of months without requiring additional fuel."[176]

Developments at Hanford Works in 1953 suggested that General Electric was making considerable progress towards harnessing the power of atomic energy for peacetime use. As explained in the previous chapter, the government constructed Hanford Works as part of the Manhattan Project in 1943, and General Electric began operating the plant during the summer of 1946 under the guidance of the government's Atomic Energy Commission. In July of 1953, it was announced that plutonium was being produced at the plant "at a higher rate than ever before."[177] The increase in plutonium production at

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[174] "Atomic Power – An Engineer's Predictions," *The General Electric Monogram*, March, 1953. p. 13.
[175] Ibid, p. 13.
[176] Ibid, p. 14.
[177] "Plutonium Plus," *The General Electric Monogram*, July, 1953, p. 7

Hanford Works was partially attributed to a $275 million plant expansion program funded by the Atomic Energy Commission.[178]

Additionally, General Electric President Ralph J. Cordiner proposed a plan in October of 1953 to make Hanford Works the site of the first large-scale nuclear power plant.[179] The *Monogram* explained that General Electric was able to make such a proposal because of the significant technological progress that had been made at Hanford Works.[180] Furthermore, the *Monogram* claimed that General Electric deserved the responsibility of carrying out such an important operation because employees of the company comprised "nearly one-sixth of 74,000 employees recently estimated by the Atomic Energy Commission for all of its operations contractors, excluding government employees and construction employees."[181]

Balough explains in *Chain Reaction* that much of the push for nuclear reactors during this period came from the military.[182] Given that nuclear reactors were expensive, complicated, and potentially dangerous, private corporations were hesitant to attempt to produce them.[183] However, the military was outspokenly in favor of nuclear reactors because they had the potential to power submarines and airplanes.[184] General Electric appeared to recognize in 1953 that producing nuclear reactors and power plants could ultimately become a profitable business for the company. W.E. Johnson, a general manager at Hanford, predicted that atomic energy would eventually take its place among

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[178] Ibid, p. 7
[179] "Large-scale Electric Power From The Atom In 5 Years," *The General Electric Monogram*, October, 1953.
[180] Ibid
[181] Ibid
[182] Brian Balogh, *Chain Reaction: Expert Debate And Public Participation In American Commercial Nuclear Power, 1945-1975* (Cambridge: Cambridge University Press, 1991) p. 95.
[183] Ibid. p. 95.
[184] Ibid. p. 95.

privately owned industries and that "the government will buy its plutonium for defense purposes as a by-product of the atomic power business."[185]

In 1954, General Electric had a banner year in atomic research. Knolls Atomic Power Laboratory in Schenectady and Hanford Works spearheaded the company's research in atomic energy for both defense and peacetime purposes.[186] Just like Hanford Works, Knolls Atomic Power Laboratory was constructed and owned by the government, but operated by General Electric. One of the primary objectives of this laboratory was to develop an effective system of nuclear propulsion for submarines.

As for the priorities of General Electric's Atomic Products division, the *Monogram* claims that the division wanted "first to progress and provide weapons for defense—new, better or cheaper—as required by the overall defense situation; second—to see that the maximum of what we learn is put to ultimate peacetime use."[187] Thus, the company saw its atomic research in 1954 first and foremost as a defense investment. According to the *Monogram*, it could not disclose many of the accomplishments at Hanford Works and Knolls Atomic Power Laboratory for national security purposes.[188]

The government also entrusted General Electric to be the lone private company to conduct atomic research. In October of 1954, the Atomic Energy Commission announced, "Among 70 organizations receiving new or renewed contracts for unclassified research, General Electric would be the only industrial concern."[189] The

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[185] "$9 Billion Industry," *The General Electric Monogram*, December, 1953. p. 6.
[186] "Entering A Banner Year," *The General Electric Monogram*, January, 1954. p. 12.
[187] "Entering A Banner Year," *The General Electric Monogram*, January, 1954. p. 12.
[188] Ibid, p. 12.
[189] "Research Leader," *The General Electric Monogram*, October, 1954. p. 18.

other contracts were given to research foundations and educational institutions.[190] General Electric's selection as the sole company to explore the commercial uses of atomic energy would be highly beneficial for the company in years to come.

General Electric made a major breakthrough in its defense work in 1955, when the Atomic Products division successfully created a revolutionary atomic reactor capable of powering submarines. The majority of the work on this atomic reactor was completed at the Knolls Atomic Power Laboratory in Schenectady.[191] The reactor was used in the *Seawolf*, which was launched in Groton, Connecticut on July 21, 1955.[192] The *Seawolf*'s atomic reactor was much more advanced than the reactor used in the *Nautilus*, which was the first atomic submarine.[193] General Electric had not produced the reactor used in the *Nautilus* which, as explained in the *Monogram*, was "a thermal type reactor which produced steam for the turbine system while the *Seawolf* uses an intermediate reactor which has a neutron speed considerably faster than the thermal type."[194]

General Electric became fully responsible for two of the most valuable atomic research laboratories in the country when the government sold Knolls Atomic Laboratory and Hanford Works to the company in May of 1956.[195] Further, although General Electric now owned these two plants, the government would continue to pay the company $2.65 million pear year to operate the plants.[196] Prior to this transaction, both of these plants had been operated by General Electric under a "cost plus $1 fee contract," and

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[190] Ibid, p. 18.
[191] "The Launching," *The General Electric Monogram*, July, 1955. p. 1.
[192] "Launching the *Sea Wolf*," *The General Electric Monogram*, June, 1955. p. 3.
[193] "The Launching," *The General Electric Monogram*, July, 1955. p. 1.
[194] Ibid, p. 1.
[195] "New AEC Contract," *The General Electric Monogram*, May, 1956. p. 7.
[196] Ibid, p. 7.

therefore the company was supposedly not making a direct profit from its work.[197] With Hanford Works and Knolls Atomic Power Laboratory now under its full ownership and with the company receiving an annual operating fee of $2.65 million, General Electric was better positioned to profit from its research and development on atomic energy.

There is room for speculation as to whether General Electric accumulated profits during its operation of Hanford Works under the "cost plus $1 fee contract." In an interview with several U.S. Senators, Vice President of Engineering H.A. Winne revealed that General Electric received a monthly payment of $200,000 for its work at Hanford.[198] Winne dismissed allegations that this money was a profit for General Electric; he claimed that the monthly payments were "an administrative fund against which we (General Electric) make such charges as we can justify as actual expenditures." Given this statement, it appears that General Electric had some discretion in determining its costs of operating Hanford Works. Stuart Brandes explains that defense contractors often times had difficulty determining "reasonable cost" of its operations.[199] In fact, some defense contractors were inclined to take advantage of the "cost plus contracts" by inflating salaries in order to make a profit.[200]

National Defense Developments (1953-1956)

General Electric made significant contributions to defense development during the first half of 1953 in support of the United States military forces in the Korean War. General Electric's defense production covered the entire military spectrum; especially important advancements were made in engines, turbines, and radar. The company's space

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[197] Ibid, p. 7.
[198] "The Plutonium Fabrication Plant," *Bulletin Of The Atomic Scientists*, June, 1949. p. 230.
[199] Brandes, p. 169.
[200] Ibid, p. 169.

department also worked on developing ballistic missiles, which were considered essential for the nation's security. Although General electric's defense sales began to decline after the Korean War ended, the company's continuing defense work pertaining to atomic energy and air power was especially important during this period. President Eisenhower's "New Look" defense strategy stressed the importance of furthering the United States' atomic and air power, and as one of the country's leading defense contractors, it was imperative that General Electric meet the President's expectations.[201]

Several advertisements appearing in *Life Magazine* between 1953 and 1956 highlight the close relationship between General Electric and the government in defense production. An advertisement that details General Electric's new technologies in torpedoes explains, "cooperation between industry and our armed services helps assure America of the best possible tools for defense…and the most protection for the taxpayers' defense dollars."[202] Another advertisement appearing in the March 1953 edition of *Life Magazine*, General Electric calls for other companies to support the national defense. The advertisement reads, "Defense is everybody's business, and our safety depends upon the successful cooperation of all companies, large and small, to meet the vital, growing needs of our Armed Forces."[203] By promoting its defense work in a mainstream magazine such as *Life*, General Electric no doubt hoped that the American public would admire the company for its dedication to national defense.

Still another advertisement appearing in the September 1954 edition of *Life Magazine* explains that the bombers of the Air Force's Strategic Air Command were

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[201] Melanson and Mayers, p. 54.
[202] "Torpedoes With Brains," *Life Magazine*, November, 1954. p. 32.
[203] "G-E Radar Gunsight Keeps Navy's Guns On Attacking Jets," *Life Magazine*, March, 1953. p. 11.

equipped with General Electric jet engines. The advertisement states, "The top performance of the six General Electric J47 jet engines, which power SAC's Boeing B-47 bombers, and much other equipment of a classified nature, is the result of years of teamwork between Air Force and G-E specialists."[204] The Air Force's Strategic Air Command bombers were considered to be essential for the nation's safety, for they had the power to attack enemies with nuclear force. The advertisement concludes, "General Electric is proud that it shares the Air Force's grave responsibility: that of keeping peace and keeping America free."[205]

General Electric also produced engines for other types of jet planes, and in May of 1956 the company announced that a General Electric jet engine was responsible for powering the world's fastest combat fighter and commercial airliner.[206] The company's engine, known as the J79, helped to "assure U.S. leadership in the race for air supremacy and security" according to J.S. Parker, General Manager of the Aircraft Gas Turbine Division.[207] The B-58 Hustler, which was the first supersonic bomber ever to be produced, was also powered by four General Electric J79 engines.[208]

During this period, General Electric's defense production team also made several advances pertaining to radar. In 1954, the Heavy Military Electronic Equipment Division strengthened the U.S. Air Force by equipping planes with the world's most powerful radar.[209] The *Monogram* provides a detailed explanation of the radar: "The search gear finds the incoming high-flying intruder aircraft, while the new height-finder, with its

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[204] "SAC Flies A Mission," *Life Magazine*, September, 1954. p. 36.
[205] Ibid, p. 36.
[206] "World's Fastest Jets," *The General Electric Monogram*, May, 1956. p. 20.
[207] Ibid, p. 15.
[208] Ibid, p. 15.
[209] "Powerful New Height-Finding Radar," *The General Electric Monogram*, November, 1954. p. 20.

powerful beam of energy, provides information on distance, altitude and flight direction which is relayed to fighter-interceptor aircraft or antiaircraft weapons."[210] With a new and improved radar, American pilots had a significant combat advantage over enemy planes.

General Electric also benefited the nation's defense through its production of gas turbines. The company was commissioned by the government to build a gas turbine for the Navy's Liberty Ship *John Sergeant* in January of 1956.[211] *The Monogram* explains, "Five United States Lines engineers who will serve aboard the *John Sergeant*, are now assigned to G.E.'s Gas Turbine Department in Schenectady where they are learning about the turbine during manufacture and test operation."[212] Once completed, the gas turbine produced in Schenectady was expected to increase the ship's speed by over 50%.[213]

Finally, General Electric's defense work during this period included rocket design and construction. 1954 marked the tenth year that General Electric had been developing guided missiles.[214] During this ten year period, General Electric "successfully launched a large rocket in the hemisphere; designed, constructed and operated the first large rocket static test facilities in the U.S.; and developed an engine with the highest specific impulse ever achieved in rocket flight."[215] General Electric formed a Special Defense Projects group in 1955, which played an essential role in the development of missile technology. According to the February, 1955 edition of *The Monogram*, the Special Defense Projects were "specially staffed and organized to serve the national defense effort in the

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[210] "Powerful New Height-Finding Radar," *The General Electric Monogram*, November, 1954. p. 20.
[211] "For Speed at Sea," *The General Electric Monogram*, January, 1956. p. 15.
[212] Ibid, p. 15.
[213] Ibid, p. 15.
[214] "Rockets Are Up," *The General Electric Monogram*, November, 1954. p. 4.
[215] Ibid, p. 5.

engineering and production of large, highly complex missile systems." A General Electric advertisement appearing in *Life Magazine* attributed the development of guided missiles during this period to "Forward thinking by your Armed Forces, backed up by the technical experiences of companies like General Electric."[216]

Overall Growth (1957 to 1961)

Between 1957 and 1961, General Electric continued to emphasize the company's important role in defense production and aerospace research for the United States government and military. The annual reports and the *Monogram* focus on the defense and aerospace industries to an even more significant degree during this period. General Electric's enhanced emphasis in defense and aerospace production is directly related to the Soviet Union's launching of Sputnik in October of 1957. General Electric began publishing *The Defense Quarterly* in 1958, which was focused on communicating ideas regarding national defense to leaders/executives in government, the military, and in major defense companies. *The Defense Quarterly* was a blatant effort by the company to step up its lobbying for defense contracts. Even so, General Electric continued to note in its publications that the defense industry was not the most profitable source of business for the company.

Paul Dickson's *Sputnik* describes the Soviet Union's launching of this satellite and explains how its successful orbit of the earth helped to spur the United States' space research and development. Dickson explains that once Sputnik was launched "The space race was under way, and the Soviets had won the first leg—the United States was agog

[216] "Guided Missiles New Defense For The Future," *Life Magazine*, June, 1952. p. 69.

and unnerved."[217] The United States government did not want the country to be viewed as weak or complacent, so it immediately set out to gain ground on the Soviet Union in the space race.[218]The government consequently invested an unprecedented amount of money in the country's space work, and as a result, American science, technology, and engineering companies became more involved in space research and development.[219]

In large part due to the successful launch of *Sputnik,* President Eisenhower was under great pressure to increase defense spending during his second term in office. The National Security Council issued the Gaither Report in November of 1957, which called for the Eisenhower Administration to greatly increase defense spending.[220] Furthermore, both Democrats and Republicans in Congress attempted to coerce Eisenhower to expand the defense budget during his second term.[221] Even so, Eisenhower maintained his position on minimizing defense expenditures, and did not allow the defense budget to grow substantially.

General Electric President Ralph J. Cordiner made it explicitly clear in the "President's Comments" section of the 1957 annual report that the company would be devoting more of its focus to defense work. Cordiner cited competition with communist nations as the primary reason why General Electric needed to play a larger role in defense production.[222] Cordiner stated that General Electric would contribute to the defense effort

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[217] Paul Dickson, *Sputnik: The Shock Of The Century* (New York: Walker Publishing Company, 2001) p. 4.
[218] Ibid, p. 5.
[219] Ibid, p. 4.
[220] Patterson, p. 419.
[221] Geelhoed and Edmonds, p. 154.
[222] "The President's Comments," *1957 Annual Report And Yearbook*, p. 1.

by working in areas of atomic energy, electronics, flight propulsion, and missile technology.[223]

Although not directly stated by Cordiner, one can infer that Sputnik inspired this renewed dedication to defense work. Cordiner argued that the contributions made by General Electric "take on an added significance in a period of history when the American economy is challenged to stay out ahead of the aggressive Communist drive for technical, military, and economic leadership."[224] Cordiner's emphasis on defense production was consistent with the defense budget adopted by the government for 1957. *Sputnik* and the Gaither Report essentially pushed Eisenhower's hand to increase the defense budget. by over $2 billion the prior year.[225]

General Electric's defense sales did not substantially increase between 1956 and 1957, but the company began to devote more of its manpower to its defense work. The 1957 annual report explains, "The grave importance which General Electric attaches to its work for national security is indicated by the fact that during 1957 nearly half of the Company's scientists, engineers and technicians were on defense assignments representing only about 20 percent of the company's activity."[226] How could General Electric possibly afford to devote half of its scientists, engineers, and technicians to its "least profitable" industry? Although the company had contended in previous years that earnings were lower in the defense industry, it saw a $245 million increase in sales and a

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[223] Ibid, p. 1.
[224] Ibid, p. 1.
[225] Omer L. Carey, *The Military-Industrial Complex and United States Foreign Policy* (Pullman: Washington State UP, 1969) p. 6.
[226] "Defense Work Includes Complex Technical Projects," *1957 Annual Report And Yearbook,* p. 24.

$34 million gain in earnings in 1957 with an increased emphasis on defense production.[227]

Due to a slow economy during the first part of the year, General Electric's sales of consumer goods dropped in 1950.[228] Fortunately for the company, sales of defense products to the government compensated for the drop in consumer sales. President Cordiner explains in the 1958 annual report that "Substantial backlogs of unfilled orders for apparatus and defense equipment assured a high level of production in these lines early in the year, when sales of consumer goods and components declined markedly."[229] While many other companies surely suffered from the declining economy, General Electric had its defense business to soften the blow.

General Electric's sales ultimately dropped by approximately $215 million in 1958, while earnings fell by only $5 million.[230] One can be assured that these results would have been substantially worse had it not been for General Electric's defense sales, which increased to 24% of the company's total sales for the year.[231] The 1958 annual report explains, "Federal government expenditures for national defense continued at high levels throughout 1958, and showed increasing trends toward use of electrical, electronic, and nuclear products and systems."[232] Just as he did in the 1957 annual report, President Cordiner reiterated the importance of General Electric's defense business in order to

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[227] "Current Earnings," *1957 Annual Report And Yearbook*, p. 29.
[228] "The President's Comments," *1958 Annual Report And Yearbook*, pp. 1-2.
[229] Ibid, pp. 1-2.
[230] "Current Earnings," *1958 Annual Report And Yearbook*, p. 29.
[231] "1958 Sales Strengthened By General Electric's Broad Diversification," *1958 Annual Report And Yearbook*, p. 5.
[232] "General Electric's 1958 Sales Topped $4 Billion Despite Year's Economic Challenges," *1958 Annual Report And Yearbook*, p. 3.

"help the United States respond vigorously to the Soviet bid for world leadership."[233] Even so, the company was reluctant to admit that defense sales truly benefited its growth. The 1958 annual report states that General Electric agreed to additional contracts with the government even though the earnings-sales ratios were lower in defense production in comparison to commercial production.[234]

1958 marked the inaugural year of General Electric's *The Defense Quarterly*. This publication was described by General Electric as being "a completely new company magazine designed to communicate significant ideas on defense to those national leaders and customers affecting General Electric's defense business." The authors of *The Defense Quarterly* were members of the electronic, atomic, and defense systems groups, and the magazine was published four times a year. The primary purpose of *The Defense Quarterly* was to justify and promote General Electric's significant role in defense production. In this sense, *The Defense Quarterly* was a part of General Electric's lobbying effort to secure its place within the Military-Industrial Complex. Publication of *The Defense Quarterly* continued all the way through the 1960s (the name of the publication changed to *The General Electric Forum* in 1967). In essence, *The Defense Quarterly* claimed that a tight-knit relationship between the government, military, and General Electric was necessary for the safety of the country.[235]

General Electric bounced back from a down year in 1958 to reach all time highs in sales and earnings in 1959. Especially impressive its $280 million in earnings, which

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[233] "The President's Comments," *1958 Annual Report And Yearbook*, p. 2.
[234] "1958 Sales Strengthened By General Electric's Broad Diversification," *1958 Annual Report And Yearbook*, p. 5.
[235] "To Aviation & Defense Industries Sales Personnel," *The Defense Quarterly*, April, 1958.

was by far the most in company history.[236] Just as sales and earnings increased, so did the scope of General Electric's defense work. Defense sales accounted for 25% of the company's total business, the highest percentage since the conclusion of the Korean War.[237] The 1959 annual report claims, "the volume of the Company's defense work depends basically on the level of national defense expenditures." However, it was not an increase in defense spending that caused General Electric's boost in defense production in 1959; the country's defense spending dropped by nearly $1 million from 1958 to 1959.[238] Instead, Eisenhower's emphasis on atomic and air power in the defense budget provided General Electric with additional research and development opportunities.

From an earnings standpoint, 1960 was a disappointing year for General Electric. Although the company's sales reached $4.2 billion, its earnings dropped to $200 million, the lowest amount earned by the company since 1954.[239] General Electric cited increasing foreign competition as the primary reason for this decline in earnings, for it forced the company to reduce price levels.[240] Defense sales also fell in 1960, dropping from 25% (in 1959) to 22% of the company's total sales.[241] The 1960 annual report attributed the decline in defense sales to the government's decision to decrease overall military procurement.[242]

The 1960 annual report again warned the company's shareowners that "in defense work generally the earnings as a per cent of sales are well below those for commercial

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[236] "Financial Highlights of 1959," *1959 Annual Report And Yearbook*
[237] "Space Projects Broaden Company's Defense Work," *1959 Annual Report And Yearbook* p. 4.
[238] Carey, p. 6.
[239] "Financial Highlights of 1960," *1960 Annual Report And Yearbook*
[240] "The Chairman's Comments," *1960 Annual Report And Yearbook*, pp. 1-2.
[241] "Space Achievements Highlight Company's Defense Work," *1960 Annual Report And Yearbook*, p. 11.
[242] Ibid, p. 11.

business."[243] In fact, General Electric went as far as to claim that being involved in the defense industry was increasingly risky for the company because it had to continuously make "development expenditures and investments in new facilities preparatory to securing many defense contracts."[244] Although defense work had been a critical factor in funding the company's growth the past 20 years, General Electric expressed concern over being vulnerable to the ebb and flow of defense production in 1960.

John F. Kennedy's election to the Presidency in November of 1960 had significant implications for the country's defense budget. When Kennedy assumed his position of office in January of 1961, he immediately sought out to reduce the rate at which America was producing nuclear weapons. Kennedy was optimistic that increasing the defense budget and reprioritizing defense spending would help to "liberate American strategy from its predominant reliance on nuclear weapons."[245] Kennedy proposed to reduce government spending on atomic energy research, and increase the country's focus on catching the Soviet Union in the space race.

General Electric was able to recover from its disappointing year in 1960 and increase both sales and earnings in 1961. Sales reached a record high of over $4.5 billion, while earnings returned to a more normal figure of $242 million.[246] Defense sales increased to 25% of total sales, which was consistent with President Kennedy's addition of over $2 million to the country's defense budget.[247] However, the 1961 annual report states that this increase in defense sales actually limited the earnings of the company: "the

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[243] Ibid, p. 11.
[244] Ibid, p. 11.
[245] Arthur Meier Schlesinger and David Sobel, *A Thousand Days: John F. Kennedy In The White House* (New York: Black Dog & Leventhal Publishers, 2005) p. 181.
[246] "Highlights of Financial Results," *1961 Annual Report And Yearbook*
[247] "Record Sales From Products For Four Main Markets; Defense And Space Activities Increased," *1961 Annual Report And Yearbook*, p. 4. and Carey, p. 6.

higher proportion of defense work in 1961 was a factor tending to limit the year's improvement in the ratio of earnings to sales."[248] Again, General Electric attempted to minimize the benefits it derived form its defense work.

Ironically, the 1961 annual report also revealed that General Electric performed $1.5 billion worth of research and development on behalf of the government during the 1950s, more than any other company.[249] The annual report acknowledged that such extensive research and development "opened up new markets, brought out new and improved products, and strengthened national security."[250] In this sense, defense production not only provided an important source of the company's revenue from the government, but also allowed the company to expand its scope of production and improve the quality of its commercial products. In my view, the argument that defense production impaired General Electric's ability to earn greater profits is not just misleading; it is downright false.

Atomic Energy Developments (1957-1961)

From 1957 to 1961, General Electric made tremendous gains in the commercial/peacetime application of atomic energy. First and foremost, in October of 1957, General Electric began operation of the world's first privately owned and operated atomic electric power plant.[251] Located in Pleasanton, California, the Vallecitos Atomic Laboratory "provided power for homes, farms, and industries in 47 California counties."[252] However, General Electric had been reluctant to build the Vallecitos Atomic

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[248] Ibid, p. 4.
[249] "The Chairman's Comments," *1961 Annual Report And Yearbook*, p. 1.
[250] Ibid, p. 1.
[251] "Powerful for Californians," *The General Electric Monogram*, October, 1957. p. 8.
[252] Ibid, p. 8.

Laboratory. In early 1952, General Electric backed out of its agreement to build the plant and agreed to complete the project only after Lewis L. Strauss, chief of the Atomic Energy Commission, offered the company $25 million in "costed operations."[253]

General Electric also opened the Dresden power plant in 1960, which was the first privately financed nuclear power plant in the United States.[254] Valued at $40 million, Dresden was built by General Electric for Commonwealth Edison.[255] Dresden reached full power operation for the first time in July of 1960, and according to the *Monogram*, Dresden's electrical output was "greater than that of any other operating atomic power station in the world designed solely for power production."[256] With the help of plants such as Vallecitos and Dresden, by 1960 General Electric had "built an international business in atomic plants, research and test reactors, supply of nuclear fuels, and controls and instrumentation systems."[257]

Although General Electric focused much of its attention on the commercial nuclear business between 1957 and 1961, the company also managed to continue defense research on nuclear propulsion for navy vessels. A new million-dollar addition was made to the Knolls Atomic Power Laboratory in January of 1957 for the study of nuclear reactors.[258] This was followed by an announcement in March that Knolls had been "given the task of developing a nuclear power plant for a Navy destroyer" by the Atomic Energy

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[253] Balogh, p. 117.
[254] "Full Power at Dresden," *The General Electric Monogram*, July, 1960. pp. 4-5.
[255] Ibid, pp. 4-5.
[256] "First Run at Dresden," *The General Electric Monogram* May, 1960. p. 6.
[257] "Heavy Capital Goods Account For 25% of Total," *1960 Annual Report And Yearbook*, p. 4.
[258] "What's New," *The General Electric Monogram*, January, 1957. p. 26.

Commission.[259] The government contributed an additional $35 million to the laboratory in June of 1958 in order to further research and development there.[260]

The *Triton*, a nuclear submarine powered by two atomic reactors created at Knolls Atomic Power Laboratory, launched in August of 1958.[261] The *Seawolf* also logged a successful 60-day voyage in October of 1958, "smashing all records for uninterrupted submergence independent of the earth's atmosphere."[262] With General Electric nuclear reactors powering the *Seawolf* and the *Triton*, the United States would be able to more effectively conduct covert submarine missions. Finally, in September of 1959 Knolls Atomic Power Laboratory was granted $18.5 million by the Atomic Energy Commission to build "natural circulation" reactors in order to create more reliable nuclear-powered ships.[263]

National Defense Developments (1957-1961)

Because of Eisenhower's "New Look" strategy, which emphasized supremacy in atomic weapons and delivery systems, and also in response to the launching of Sputnik, General Electric's primary focus in defense production shifted to research in the field of missiles and space between 1957 and 1961. In late June of 1957 the government awarded General Electric a $158 million contract to lead studies on long-range ballistic missiles.[264] The largest defense contract awarded to General Electric since World War II required the company to design nose cones for the Atlas intercontinental ballistic missile

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[259] "Power for a Destroyer," *The General Electric Monogram* March, 1957. p. 10.
[260] "High-priority Reactor," *The General Electric Monogram*, June, 1958. p. 6.
[261] "The Launching of the Triton," *The General Electric Monogram*, August, 1958. p. 4.
[262] "Historic Voyage," *The General Electric Monogram*, October, 1958. p. 1.
[263] "Big Job for KAPL," *The General Electric Monogram*, September, 1959. p. 1.
[264] "Key to Future Survival," *The General Electric Monogram*, July, 1957. p. 11.

and the Thor intermediate range ballistic missile.[265] The study and development of these missiles was considered to be "the nation's highest priority defense program" in 1957.[266] This contract followed an $83 million contract signed by General Electric in April to work on the guidance system for the Atlas missile.[267] The Air Force awarded General Electric an additional $101 million contract for the development of nose cones in November of 1959.[268]

General Electric also announced in November of 1959 its plans for the construction of a $14 million space facility in Valley Forge, Pennsylvania.[269] The *Monogram* explains, "It will be one of the nation's largest privately financed space facilities, an example of private industry's effort to help the U.S. attain space leadership."[270] General Electric was hopeful that the construction of the Valley Forge space center, which it planned to complete by early 1962, would not only contribute to the government space program, but also would allow the company to become a leader in space developments.[271]

The highlight of General Electric's work for the space program in 1960 was its recovery of the Discoverer satellite, which was "the first known recovery of a man-made object that survived re-entry into the earth's atmosphere."[272] In 1961, General Electric

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[265] Ibid, p. 11.
[266] Ibid, p. 11.
[267] "Guidance Work on the *Atlas* Missile," *The General Electric Monogram*, April, 1957. p. 1.
[268] "Mark III Coming Up," *The General Electric Monogram*, November, 1959. p. 7.
[269] "New Research Center," *The General Electric Monogram* November, 1959. p. 3.
[270] Ibid, p. 3.
[271] "Into Orbit and Home Again," *The General Electric Monogram*, September, 1960. p. 5.
[272] Ibid, p. 9.

was one of three companies selected by NASA to conduct studies for Project Apollo, which was the United States' attempt to land a man on the moon.[273]

General Electric was also selected by the Air Force to build the world's largest radar system in March of 1958.[274] Called the Ballistic Missile Early Warning System, the company's Heavy Military Electronic Equipment Department was given the responsibility of "designing, developing, producing, testing, and placing in operation the super radar system."[275] The Heavy Military Electronic Equipment Department ultimately designed the FPS-7, which was capable of "detecting aircraft at higher altitudes and longer distances and supplying target data faster than present systems."[276] Such radar was designed to help protect the United States from a nuclear attack. General Electric also played an essential role in producing electronic control systems for planes used by the Air Force. The Air Weapons Control System 212L, which began development in May of 1959, was described as the "U.S. Air Force's answer to the vast problem of air defense outside of the Continental United States."[277]

General Electric's 1960 annual report explains that the company's work on electronic equipment focuses on "many types of radar, guidance and fire control systems for missiles, nose-cone re-entry vehicles, sonar equipment for submarine detection and automatic flight equipment."[278] From this statement, it is clear that the company's defense work was guided by Eisenhower's emphasis on missiles and air power.

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[273] "Next Stop," *The General Electric Monogram*, May, 1961. p. 1.
[274] "Largest Radar System For the Free World," *The General Electric Monogram*, March, 1958. p. 6.
[275] Ibid, p. 6.
[276] "Opening a New Era in Radar," *The General Electric Monogram*, July, 1959. p. 3.
[277] "The Air Force's Answer," *The General Electric Monogram*, May, 1959. p. 1.
[278] "Space Achievements Highlight Company's Defense Work," *1960 Annual Report And Yearbook*, p. 11.

General Electric, the government and the military continued to benefit from working cooperatively between 1953-1961. The Korean War as well as Cold War rearmament required that the country maintain a relatively high level of defense production. Just as it did during World War II, the government called upon General Electric to be a leading supplier of defense products and to continue defense related research and development. In part through contributions of General Electric and other defense contractors, the government was able to guarantee the nation's security by fielding a well equipped and technologically advanced military.

Business with the government through defense contracts continued to provide General Electric with a steady source of income. Furthermore, defense production lead to opportunities for the company in atomic energy, space research, and jet engine production, all of which would become increasingly profitable industries during the 1960s. During this period, there was a strong correlation between the growth of General Electric (in terms of sales and earnings) and the percentage of the company's defense sales. However, the company downplayed the importance of the defense industry to its well-being. General Electric acknowledged that the research, development, and production it performed for the government and military was necessary for national defense, but claimed that the defense industry was less profitable than commercial business.[279]

[279] "The President's Letter," *1953 Annual Report And Yearbook*, p. 5.

IV. General Electric And The Military-Industrial Complex (1962-1970)

The following chapter focuses on General Electric's role within the Military Industrial Complex between 1962 and 1970. Increasing Cold War tensions as well as the United States' involvement in the Vietnam War tightened the relationship between the government, the military, and General Electric. General Electric competed with other companies for government contracts in a variety of fields pertaining to national defense. The government drew upon General Electric's technical capabilities to ensure the country's national security, and just as in past years, the work General Electric performed for the government greatly benefited the sales and scope of the company.

The three primary areas in which General Electric worked under government contracts were in atomic/nuclear research, space research, and defense production. The research and development performed by General Electric on behalf of the government paid huge dividends for the company between 1962 and 1970 by creating new commercial opportunities. General Electric became a leader in the nuclear power business as well as the top provider of jet engines for commercial airlines. Furthermore, General Electric was a principal supplier of aerospace products for the government. Because of its leading role in these industries, General Electric was able to effectively expand its business to the international level. Thus, General Electric capitalized on government funding it received in these three areas to create successful commercial businesses. Furthermore, the company continued its direct defense work by producing defense materials for the military. Even so, General Electric persisted in downplaying the importance of the defense industry to the growth of the company.

The United States' defense budget varied between 1962 and 1970. While President Kennedy was in office (1961-November of 1963), defense spending steadily increased. However, when President Lyndon Johnson came to power after Kennedy's assassination, he immediately cut back on defense spending. President Johnson felt that a build up of military forces in Vietnam was necessary in preparation for a potential war. However, he did not believe that increased defense spending was necessary for this build up. Rather than increasing the overall defense budget, Johnson spent a larger portion of the budget on the military resources needed by the American military in Vietnam in 1964 and 1965. It was not until 1966 that Johnson chose to drastically increase the defense budget.[280]

This chapter will be divided into four sections. The first section will track the growth and outlook of General Electric between 1962 and 1970 by focusing on the company's annual reports. The second section will describe the contributions made by General Electric's to the space industry. The third section will explain the company's involvement in atomic and nuclear research. The final section will describe General Electric's defense production, particularly the production of jet engines for the military, and its relationship to the company's growing business in commercial aviation.

Overall Growth

Between 1962 and 1970, General Electric experienced dramatic growth. Over the course of eight years, sales improved at a relatively steady pace; sales in 1970 were $3.75 billion higher than sales in 1962.[281] Earnings, on the other hand, fluctuated on a yearly basis, and did not appear to follow a particular trend. Earnings in some years were

[280] Marilyn Blatt Young and Robert Buzzanco, *A Comparison To The Vietnam War* (Maiden, MA: Blackwell Publishers, 2002) pp. 162-164.
[281] "Ten Year Summary," *1970 Annual Report And Yearbook*, pp. 38-39.

especially high ($361 million in 1967), while earnings in other years were disappointing ($219 million in 1964).[282] The percentage of sales on defense products also varied during this period, but remained between the range of 17%-24% of the company's total sales. The company's work in aerospace production was mainly for the government and was considered essential for the nation's security. Therefore, General Electric included its aerospace sales within the company's defense production.

General Electric had a successful year in 1962 in terms of overall sales and earnings. Sales increased by 8% and earnings were 10% more than those from 1961.[283] Sales by the defense products departments accounted for nearly a quarter (24%) of the company's total sales.[284]

The growth of its space business was an especially important achievement by General Electric during 1962. President Cordiner explained in the 1962 annual report that the space business, "starting in 1955 with 300 people and a single contract, had grown by the end of 1962 to Division status, employing 13,000 people in a wide variety of aerospace projects."[285] The 1962 annual report also highlights work being done by General Electric under government contract on missiles and electronics. In order to make sure that the company's aerospace and defense divisions were working hand in hand, General Electric formed the Defense Programs Operation in 1962, which had the responsibility of "serving the government's aerospace and defense needs on a unified basis."[286] Finally, the report explains that the military's limited but increasing

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[282] Ibid, p. 38.
[283] "1962 Sales And Earnings," *1962 Annual Report And Yearbook*, pp. 1-2.
[284] "1962 Aerospace And Defense," *1962 Annual Report And Yearbook*, p. 4.
[285] "The Chairman's Comments," *1962 Annual Report And Yearbook*, p. 1.
[286] "1962 Aerospace And Defense," *1962 Annual Report And Yearbook*, p. 4.

involvement in Vietnam caused General Electric to place "added emphasis on the development of faster and more powerful helicopters."[287]

Just as they did in 1962, sales and earnings increased for General Electric in 1963. On the other hand, defense production slightly decreased in 1963, amounting to 22% of the company's total sales.[288] The 1963 annual report states that it was not the company's choice to decrease its defense output; instead, several of the programs being worked on by the company were cancelled.[289] Given President Kennedy's desire to reduce production of nuclear weapons production, one might assume that research and development contracts related to atomic energy were cancelled. Increases in orders for military jet engines helped to minimize the losses from these cancelled programs.[290]

Although defense sales dropped in 1963, the 1963 annual report states, "General Electric people continued to have major responsibilities during 1963 in forwarding the nation's defense effort and its program of space exploration."[291] Clearly, General Electric did not shy away from taking credit for the contributions it was making to national defense. However, the 1963 annual report continued the theme from prior annual reports that defense work was not the most profitable business for the company: "there is a growing disparity between profits on commercial work and on defense projects."[292]

In 1964, General Electric achieved new highs in sales, but earnings were adversely affected by an event unrelated to its defense work.[293] An antitrust case brought

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[287] Ibid, p. 6.
[288] "Further Balanced Growth In Sales," *1963 Annual Report And Yearbook*, p. 8.
[289] Ibid, p. 8.
[290] Ibid, p. 8.
[291] "In Aerospace And Defense, A Time Of Adjustment," *1963 Annual Report And Yearbook*, p. 18.
[292] "Further Balanced Growth In Sales," *1963 Annual Report And Yearbook*, p. 8.
[293] "1964 Financial Highlights," *1964 Annual Report And Yearbook*

by the government in 1960 against General Electric and others was settled in 1964, which had significant repercussions for the company's earnings. Along with 29 other electrical companies, General Electric was convicted of price fixing and bid rigging, and consequently had to repay the customers it had overcharged.[294] Once losses from the antitrust case were taken into account, the company's earnings dropped severely.[295]

General Electric's defense production also dropped from 22% of total sales in 1963 to 17% of total sales in 1964.[296] In a similar fashion to 1963, it was not the company's desire to decrease defense production; the 1964 annual report explains that the government's decision to cut back on defense expenditures made "1964 a year of decreased sales for many defense contractors," not just General Electric.[297] As previously explained, the cut in the 1964 defense budget occurred because of President Johnson's priorities when he came into office. Even so, General Electric continued to champion its important role in defense production. The annual report states, "The tremendous range of the Company's contributions to the nation's security and space exploration programs, and its capabilities for handling highly complex systems, are expected to maintain General Electric's annual aerospace and defense business at about the billion-dollar level."[298]

After a disappointing year in 1964 caused by the settlement of the antitrust case, General Electric bounced back to have a much more successful year in 1965. Sales and earnings in 1965 increased by 14% and 21% respectively over the previous year.[299] The annual report characterized 1965 as a "turnaround year" for the company in terms of its

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294 "Antitrust: The High Cost Of Price Fixing," *Time Magazine*, September, 1965.
295 "General Electric 1964 Financial Statements," *1964 Annual Report And Yearbook*, p. 26.
296 "1964 Sales And Earnings," *1964 Annual Report And Yearbook*, p. 3.
297 "G-E Space Projects Show Strength," *1964 Annual Report And Yearbook*, p. 12.
298 Ibid, p. 12.
299 "Comments By The President And Chairman," *1965 Annual Report And Yearbook*, p. 1.

aerospace and defense work.[300] In 1965, the United States greatly expanded its military forces, and therefore needed defense contractors to provide increased amounts of defense materials. Although defense sales remained at 17% of the company's total sales, General Electric significantly aided the United States military through its defense production. The annual report explains, "In response to the U.S government's call for advanced equipment to strengthen the nation's defenses and to help meet commitments in Vietnam, the Company increased production of jet engines and flight control and armament systems for planes and helicopters."[301] The company also continued to develop its nuclear business and made progress on Project Apollo with NASA.

General Electric increased sales by close to $1 billion in 1966, but earnings fell from those of the prior year.[302] Building off of the "turnaround year" in 1965, aerospace and defense sales rose 22% over 1965 levels, in part due to the expanding needs of the United States military forces in Vietnam.[303] The 1966 annual report claims, "The Company is maintaining the bulk of its aerospace and defense activity in longer-term projects for national security, U.S. space programs and commercial uses of jet engines."[304] Additionally, General Electric continued to improve its position in the nuclear industry. Speaking of its nuclear business, the annual report states, "The Company's leadership in this new industry was clearly established in 1966."[305]

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[300] "For General Electric In 1965: New Responsibilities In Defense And Space," *1965 Annual Report And Yearbook*, p. 16.
[301] Ibid, p. 16.
[302] "Consolidated Statement of Current and Retained Earnings," *1966 Annual Report And Yearbook*, p. 25.
[303] "New Commercial And Military Projects Add To GE Jet Engine Potential," *1966 Annual Report And Yearbook*, p. 3.
[304] Ibid, p. 3.
[305] "Nuclear Energy Takes The Lead In Power Generation Orders," *1966 Annual Report And Yearbook*, p. 10.

Sales and earnings increased for General Electric in 1967, primarily because of the company's success in new industries. The 1967 annual report claims, "The Company has underway the greatest array of major new growth ventures in its history."[306] Two of the four "new growth ventures" listed were nuclear energy and advanced commercial aircraft engines.[307] Thus, General Electric's commercial applications of nuclear energy and jet engines were reaping great rewards for the company.

Furthermore, General Electric raised its defense sales in 1967, as they accounted for 20% of the company's total sales.[308] The annual report attributes this increase in defense sales to the military's need for materials in Vietnam. However, the company asserts that "by far the largest portion of this business remains based in long-term defense and aerospace programs."[309] Although General Electric acknowledged in the annual report that aerospace and defense operations helped to improve the company's earnings in 1967, it once again maintains that profit levels in the defense industry are lower than those for its commercial business.[310]

Sales continued to improve for General Electric in 1968, but the company's earnings dropped from the previous year.[311] Just as they had in 1967, General Electric's defense sales represented 20% of the company's total sales in 1968.[312] General Electric continued to maintain its stance in the 1968 annual report that the company's defense production was primarily in long-term projects for the military.

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306 "Comments by the President and Chairman," *1967 Annual Report And Yearbook*, p. 2.
307 Ibid, p. 2.
308 "Electronics Lead Advances In Aerospace And Defense Sales," *1967 Annual Report And Yearbook*, p. 13.
309 Ibid, p. 13.
310 Ibid, p. 13.
311 "Consolidated Statement of Current and Retained Earnings," *1968 Annual Report And Yearbook*, p. 29.
312 "General Electric Worldwide Sales 1959-1968," *1968 Annual Report And Yearbook*, p. 3.

Although 1968 was not a great success from a financial standpoint, General Electric solidified itself as a leader in the nuclear, space, and commercial airline business. According to the 1968 annual report, the company's work on jet engines allowed it to "establish a new foothold in the business of supplying jet engines for commercial aircraft."[313] The annual report also emphasized the important role the company had within the nuclear business, saying, "General Electric has led in building not just a business but an industry. With 44 nuclear plants completed or on order at the end of 1968, and with production scheduled well into the 1970's, our reactor systems operations alone have grown into a substantial business."[314] Finally, the annual report asserts that the important role played by General Electric in the success of the Apollo 8 flight established the company as "one of the major U.S. space companies."[315]

In terms of sales and earnings, 1969 was not an impressive year of growth for General Electric. Sales improved minimally, while earnings declined drastically because of a three month long strike towards the end of the year.[316] General Electric's defense production slightly declined in 1969; it accounted for 19% of the company's total sales.[317] The 1969 annual report attributes this decline to delayed shipments caused by the fourth quarter strike and a substantial reduction in federal defense spending.[318]

No doubt the biggest achievement for General Electric in 1969 was the role it played in helping NASA land the first man on the moon. The annual report describes the extent of the company's involvement in Apollo 11's historic flight, saying, "All in all, no

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[313] "Comments On 1968 Results And The Outlook," *1968 Annual Report And Yearbook*, p. 2.
[314] Ibid, p. 1.
[315] Ibid, p. 2.
[316] "Chairman's Comments," *1969 Annual Report And Yearbook*, p. 3.
[317] "Review of 1969 Operations," *1969 Annual Report And Yearbook*, p. 17.
[318] Ibid, p. 17.

less than 37 General Electric operations, directly involving more than 6,000 employees, contributed to the vast industrial team effort that supported man's first moon step."[319] Finally, the annual report emphasizes the importance of commercial aviation to the company's future growth.[320]

General Electric's defense sales in 1970 were nearly identical to its in 1970 sales, while the company's earnings increased by $11 million.[321] According to the 1970 annual report, technologies stemming from General Electric's space operations were helping to solve the United States' urban and environmental problems.[322] The annual report states, "GE aerospace technology was being applied in projects for the Departments of Health, Education and Welfare, Housing and Urban Development, and Interior, as well as for the Environmental Protection Agency and the National Oceanic and Atmospheric Administration."[323] Surprisingly enough, General Electric's aerospace technologies had civilian applications that benefited American citizens. As for the company's nuclear business, by the conclusion of 1970, General Electric had equipped 54 active nuclear plants across the globe.[324]

Space Business

General Electric made a substantial contribution to the success of the National Aeronautics and Space Administration (NASA) between 1962 and 1970. NASA was established in 1958 in response to the Soviet Union's launching of *Sputnik* with the aim of furthering the United States' progress in space technology. The significant feats

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[319] Ibid, p. 5.
[320] Ibid, p. 17.
[321] "Review of 1970 Operations," *1970 Annual Report And Yearbook*, p. 5.
[322] "Chairman's Comments," *1969 Annual Report And Yearbook*, p. 4.
[323] "Aerospace," *1970 Annual Report And Yearbook*, p. 19.
[324] "Industrial Power Equipment," *1970 Annual Report And Yearbook*, p. 13.

accomplished by NASA between 1962 and 1970 could not have been achieved without the important role played by General Electric. The primary ways in which the company aided space travel were by testing Saturn rockets, developing a radio guidance system, and supplying fuel cells for electrical power.

General Electric was selected in 1962 to play a significant role in Project Apollo, which was NASA's plan to land a man on the moon by 1970. The 1963 annual report explains the ways in which General Electric was expected to aid Project Apollo: "General Electric will perform a vital role in assisting the National Aeronautics and Space Administration in the performance of reliability assessment, check-out and integration support for the Apollo system."[325] In an attempt to make sure that General Electric did not unfairly profit from its work in Project Apollo, the company's contract with NASA stipulated, "General Electric is barred from serving as a contractor or supplier in certain other areas where its privileged relationship to the Apollo program gives it a special advantage."[326] General Electric was also given the responsibility of operating NASA's Mississippi Test Facility, which was valued at over $270 million.[327] The *Monogram* explains, "On this 13,500-acre site NASA will test the towering Saturn rocket boosters that will propel manned Apollo spacecraft to the moon."[328] General Electric ultimately directed over 6,000 of its employees to work on Project Apollo, 1,200 of whom were stationed at the Mississippi Test Facility.[329]

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[325] "In Aerospace And Defense, A Time of Adjustment," *1963 Annual Report And Yearbook*, p. 18.
[326] Vernon Van Dyke, *Pride And Power: The Rationale Of The Space Program* (Urbana: University of Illinois, 1964) p. 222.
[327] "Live From Mississippi," *The General Electric Monogram*, June, 1964. p. 10.
[328] Ibid, p. 10.
[329] "Project Apollo: Countdown To The Moon," *The General Electric Monogram*, March, 1968. p. 9, 11.

An especially exciting event for General Electric occurred in September of 1962 when Elliot See was named as a member of the nine-man astronaut team for Project Gemini.[330] A General Electric employee for over twelve years, See worked as a test pilot prior to being selected by NASA for Project Gemini.[331] The primary objective of Gemini was to complete "an outer-space rendezvous of manned spacecraft early in 1964."[332] The first Gemini spacecraft ultimately was sent into orbit with the help of General Electric's radio guidance team in March of 1965.[333] Fuel cells developed by General Electric helped to power a subsequent Gemini mission August of 1965.[334]

General Electric's role in the space industry had a significant impact on American satellite technology. Nimbus, a weather satellite designed and built by General Electric under NASA's guidance, was successfully launched in August of 1964.[335] The *Monogram* explains that while in orbit, the Nimbus "gave meteorologists a more complete and sophisticated look at the earth's weather than was ever possible before."[336] In June of 1967, Vice President Hubert Humphrey stressed the importance of the Nimbus weather satellite, declaring that predicting and understanding weather would have the overall effect of improving human life.[337] According to the *Monogram*, Vice President Humphrey believed that the Nimbus satellite was "a great benefit to mankind and that the dividends of the entire space program are found in this one object."[338]

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[330] "Our Man On The Astronaut Team," *The General Electric Monogram*, September, 1962. pp. 1-2.
[331] Ibid, pp. 1-2.
[332] Ibid, p. 2.
[333] "Biggest Month at the Space Travel Desk," *The General Electric Monogram*, April, 1965. p. 4.
[334] "The Fuel Cell Saga," *The General Electric Monogram* September, 1965. p. 1.
[335] "Coming Of Age With Nimbus," *The General Electric Monogram*, September, 1964. p. 1.
[336] Ibid, p. 1.
[337] "Welcome, Mr. Humphrey," *The General Electric Monogram*, June-July, 1967. p. 1.
[338] Ibid, p. 1.

General Electric was also involved in space projects for the government that were clearly military oriented. In August of 1965, the company was selected by the government to "plan and develop the space experiments" for the Manned Orbiting Laboratory.[339] The Manned Orbiting Laboratory (MOL) was a $1.5 billion government space program with the mission of launching a spacecraft into the earth's atmosphere that would remain in orbit for up to 30 days.[340] According to the *Monogram*, the purpose of the MOL program was to "learn more about what man is able to do in space and how that ability can be used for military purposes, develop technology and equipment which will help advance manned and unmanned space flight, and experiment with this technology and equipment."[341] As evidenced by the MOL program, work done by General Electric for the government in the space industry was another arena in which General Electric profited from its role in the military industrial complex.

General Electric acknowledged that it was seeking to profit from its work in the space business. The January, 1963 edition of the *Monogram* frankly states that "Space is a big and profitable business *now*."[342] The company attempted to increase interest in its space business with foreign customers in April of 1965, inviting European industrialists from 72 different companies to convene in Philadelphia for a discussion of the growing space industry.[343] J.S. Parker, an executive in the company's Aerospace and Defense

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[339] "Aboard A New Space Series," *The General Electric Monogram*, September, 1965. p. 2.
[340] Ibid, p. 4.
[341] Ibid, p. 4.
[342] "What's Happening *Now* in General Electric?," *The General Electric Monogram*, January, 1963. p. 1.
[343] "Hands Across the Void," *The General Electric Monogram*, May, 1965. p. 10.

Group, asserted to this group, "We have, in a sense, a world-wide common market in space and we should both work now to develop and expand it."[344]

The work performed by General Electric on the Apollo project as well as other government-funded programs elevated the company's status in the space industry. In the September 1969 edition of the *Monogram*, General Electric's G. T. Smiley, who was the general manager of Apollo Systems, explained how the company expected to benefit from its involvement in Project Apollo.[345] Smiley predicted that General Electric would gain longer range business opportunities from its work on Project Apollo, and would also be able to transfer technologies from the project to other businesses outside of the Aerospace Group.[346] An editorial from the *Monogram* highlights the importance of the space industry to the growth of the company: "Progress in the air and space is offering General Electric tremendous opportunities to demonstrate its competence and leadership. Many of the new technologies unfolding will make man's life better on the ground as in the air. And that's what General Electric traditionally emphasizes."[347]

Atomic and Nuclear Business

General Electric began 1962 with a new outlook regarding its research on atomic power. Members of the company's Atomic Power Equipment Department were hopeful that their research on atomic power would become a profitable business for the company in the immediate future. The June 1962 edition of the *Monogram* explains that General

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[344] Ibid, p. 11.
[345] "Apollo II," *The General Electric Monogram*, September, 1969. pp. 8-10.
[346] Ibid, pp. 8-9.
[347] "Decade of the Moon," *The General Electric Monogram*, March, 1968.

Electric was "Departing significantly from previous sessions, placing emphasis clearly on the *business* aspects of atomics, rather than on the *atomics* aspects of business."[348]

General Electric announced in January of 1964 that the company would no longer be operating Hanford Works for the Atomic Energy Commission.[349] Hanford Atomic Products Manager Wilfrid E. Johnson explained that although the move might take the public and employees by surprise, it "will enable the Company to best serve the expanding needs of the nation's atomic energy industry while fulfilling its responsibilities to the AEC, Hanford employees, and the area communities."[350] While under the care of General Electric, Hanford grew its value by nearly $1 billion.[351] The *Monogram* states that General Electric was promoting the growth of the atomic energy industry by handing over the responsibility for Hanford to other companies and consequently getting them involved in the atomic energy field.[352] In order to guarantee commercial diversification in Richland (the town in Washington that Hanford is based), General Electric and the AEC wanted several companies to take over Hanford rather than a single company.[353]

Although General Electric claimed that it was helping the growth of the atomic industry by relinquishing its responsibility at Hanford Works, it appears that the true reason for this decision was that the company wanted to focus on expanding its nuclear power business. Balogh explains that during the period from 1964 to 1968 a "Great Bandwagon" market emerged for nuclear power plants.[354]

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[348] "It's Closer Than You Think," *The General Electric Monogram*, June, 1962. p. 6.
[349] "New Management for Hanford," *The General Electric Monogram*, January, 1964. p. 5.
[350] Ibid, p. 5.
[351] "Good-byes At Hanford," *The General Electric Monogram*, August, 1967. p. 5.
[352] "New Management For Hanford," *The General Electric Monogram*, January, 1964. p. 5.
[353] "Good-byes At Hanford," *The General Electric Monogram*, August, 1967. p. 5.
[354] Brian Balogh, *Chain Reaction: Expert Debate And Public Participation In American Commercial Nuclear Power*, p. 204.

By March of 1964, General Electric was advertising nuclear power as a reasonable alternative to fossil fuels for creating energy.[355] George Stathakis, Marketing Manager of the company's Atomic Power Equipment Department claimed, "Nuclear power is not only competitive with fossil fuels in generating electricity but really quite conventional."[356] Atomic power generating stations officially became a General Electric product in October of 1964 when the construction of such facilities was featured in the company's product handbook.[357] Potential customers now had the option of ordering nuclear reactors or entire power plants from General Electric.[358]

Progress in the nuclear field allowed General Electric to market nuclear power plants both domestically and to customers outside of the United States. Thanks in part to government funding, General Electric had become one of the leaders in nuclear technology, and the company now wished to make a profit from its expertise in this field. By turning its attention to the commercial side of nuclear power, General Electric partially detached itself from government influence in the nuclear field.

General Electric began selling nuclear reactors and creating power plants for domestic companies on a regular basis during the 1960s. Some of these plants were built on a "turnkey" basis, meaning that General Electric not only provided all of the products necessary for a nuclear plant, it was responsible for constructing the plant.[359] Balogh explains, "Competition between manufactures eager to sell a technology they had already

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[355] "Price List for Nuclear Plants," *The General Electric Monogram*, March, 1964. p. 6.
[356] Ibid, p. 6.
[357] "It's In The Book," *The General Electric Monogram*, October, 1964. p. 6.
[358] Ibid, p. 6.
[359] "Review of 1968 Operations," *1968 Annual Report And Yearbook*, p. 19.

invested billions in was clearly one factor prompting the turnkey concept."[360] For other plants, General Electric simply provided to customers the reactor and other equipment necessary for a nuclear power plant.

General Electric accepted the "turnkey" orders initially because they "helped create a market and establish the nuclear business."[361] However, during the latter half of the 1960s, General Electric generally tried to stay away from building plants on a "turnkey" basis, for the company found that it was more difficult to make a profit on these sales. Arguably the most significant plant that General Electric provided nuclear equipment for between 1962 and 1970 was the Tennessee Valley Authority's (TVA) plant in northern Alabama.[362] General Electric agreed to a $122 million contract in June of 1966 to provide nuclear power equipment to the TVA.[363] TVA's decision to "go nuclear" was of great importance because the company was one of the largest users of coal for energy.[364] The *Monogram* claimed, "TVA's decision to build a nuclear plant after an exhaustive study is a big victory for atomic power in its competitive battle with fossil-fueled stations."[365]

General Electric also made large profits by selling nuclear power equipment to foreign customers. In May of 1964, the company signed a contract with the government of India to construct a nuclear power plant for that country.[366] The contract stated that the

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[360] Balogh, p. 203.
[361] Ibid, p. 19.
[362] "The TVA Order," *The General Electric Monogram*, June, 1966. p. 4.
[363] Ibid, p. 4.
[364] Ibid, p. 5.
[365] Ibid, p. 5.
[366] "Signed up for Tarapur," *The General Electric Monogram*, May, 1964. p. 4.

Indian government would pay General Electric $95 million to construct the station and provide it with nuclear fuel.[367]

In order to further its nuclear business on the international front, General Electric formed jointly owned companies, known as "joint ventures", with foreign corporations all over the world. General Electric's first joint venture was with the German company Allgemeine Elektrizitas Gesellschaft (AEG).[368] The June 1965 edition of the *Monogram* states that their joint venture would "manufacture reactor components and produce nuclear fuel within the European Common Market."[369] Predicting that the demand for electrical power would double within the next decade, General Electric hoped that its joint venture with AEG would profit by supplying electrical power through nuclear reactors.[370] General Electric also formed joint ventures with Japanese, Swiss, and Italian corporations. As of July of 1965, seven atomic power stations were built by these joint ventures on foreign territory in West Germany, Italy, and Japan, while further stations were under construction in the Netherlands, India, and West Germany.[371]

Although General Electric was now focused on the commercial aspect of nuclear power, it was still awarded significant research and development contracts from the government in this field. In March of 1967, General Electric signed two contracts with the government totaling nearly $2 million to study the design of nuclear plants and reactors.[372] Furthermore, Knolls Atomic Power Laboratory's contract with the Atomic Energy Commission to perform research in the field of naval nuclear propulsion was

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[367] Ibid, p. 4.
[368] "Inside The Common Market," *The General Electric Monogram*, June, 1965. p. 5.
[369] Ibid, p. 5.
[370] "Inside The Common Market," *The General Electric Monogram*, June, 1965. p. 5.
[371] "Reactor For Spain," *The General Electric Monogram*, July, 1965. p. 4.
[372] "Two Giant Steps," *The General Electric Monogram*, April-May, 1967. p. 9.

extended by five years in March of 1969.[373] The *Monogram* explains that General Electric has operated this laboratory "since the very inception of the naval nuclear program," and "trusts that future challenges (supporting the nation's defense) will be met and answered with continued success."[374]

General Electric was also focused on improving its own nuclear facilities in order to boost its position within the nuclear industry. In 1969 the company completed its construction of a brand new plant in Wilmington, North Carolina.[375] According to the *Monogram*, the plant "quadrupled the Nuclear Energy Division's capacity, making it the world's largest plant totally devoted to commercial nuclear reactor component and fuel production."[376] Congressmen Chet Holifield, who was the speaker at the Wilmington plant's dedication, noted the importance of the plant to the nation as a whole. Holifield said, "The output from this plant will contribute to the development of nuclear energy as a vital national resource—a fifth source of needed energy to meet the growing needs of this nation."[377]

Other government leaders also encouraged General Electric's entrepreneurship in the nuclear business. On numerous occasions between 1962 and 1970, American politicians visited General Electric's nuclear plants and commended the company for the work it was doing. For example, during a visit to Hanford Works in October of 1963, President John F. Kennedy encouraged General Electric employees to "hasten the development of low cost atomic power" and "take full advantage of technological

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[373] "Kudos For KAPL," *The General Electric Monogram*, March, 1969. p. 7.
[374] Ibid, p. 7.
[375] "Dedication At Wilmington," *The General Electric Monogram*, May, 1969. p. 14.
[376] Ibid, p. 14.
[377] Ibid, p. 14.

advances in both generating and transmitting electrical energy."[378] With the help of the government, General Electric was able to build a full-fledged business in nuclear power.

Defense Business

General Electric continued its steady production of jet engines, missile systems, and defense electronics for military purposes between 1962 and 1970. Production in these areas was of particular importance given the United States' involvement in the Vietnam War. Many of the defense projects taken on by General Electric during this time period were long term, which guaranteed continued business between the company and government on behalf of the military. The expertise and technology developed by General Electric in its production of jet engines for the military also gave the company a significant advantage in designing and producing jet engines for commercial airlines during this period.

General Electric signed several key government contracts for the production of jet engines between 1962 and 1970. In October of 1963, the Air Force placed a $187 million order with General Electric for the continued production of J79-15 engines.[379] This was the largest contract signed between the Air Force and the company since the Korean War.[380] General Electric received further orders for the production of jet engines in January of 1965, which totaled over $200 million.[381] In a report from the April 1966 edition of the *Monogram*, the J79 engine was performing very well under battle conditions in Vietnam.[382] The report claims that the engine held its own against enemy

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[378] "The President Goes To Hanford," *The General Electric Monogram*, October, 1963. p. 10.
[379] "Also, A Big J79 Order," *The General Electric Monogram*, October, 1963. p. 6.
[380] Ibid, p. 6.
[381] "Fast Take-off For 1965," *The General Electric Monogram*, January, 1965. p. 16.
[382] "Jetpower For Vietnam," *The General Electric Monogram*, April, 1966. p. 10.

fire, and that unscheduled maintenance of the engine was at a minimum.[383] Furthermore, the report states that American pilots were very appreciative of the J79-15 engines being produced by General Electric. One American pilot fighting in Vietnam is quoted as saying, "The pilots are very staunch J79 men and say that missions they have been flying make them appreciate the engines more than they had before."[384]

General Electric also continued its work in defense electronics between 1962 and 1970. Early in 1965, two major military electronics orders were received by General Electric's Heavy Military Electronics department, which were predicted to "provide a working base for the department for the next three or four years."[385] The two contracts provided by the government aim to improve existing sonar and radar systems for the military.[386] The radar being developed by General Electric gave American soldiers and advantage while fighting in Vietnam. According to Tom Paganelli, the general manager of General Electric's Heavy Military Electronics Department, "The General Electric radars in use in Vietnam were designed to give the guy fighting this kind of war a capability and accuracy not previous available. Continued developments of tactical electronic equipment will help our fighting men be even more effective."[387]

Further defense work performed by General Electric centered on the Poseidon missile program. The United States Navy announced in March of 1966 that General Electric would be receiving up to $80 million over a five-year span in order to develop

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[383] Ibid, p. 10.
[384] Ibid, p. 10.
[385] "Big Break At Syracuse," *The General Electric Monogram*, February, 1965. p. 6.
[386] Ibid, p. 6.
[387] "Radar Does It Better," *The General Electric Monogram*, February, 1967. p. 3.

the Poseidon missile system.[388] In a similar fashion to the Polaris missile system, the Poseidon missile system was to be used by submarines to launch missiles out of the water and hit targets on land. President Lyndon Johnson described the Poseidon missile system as "twice as accurate with double the payload of the Polaris missile."[389] A Poseidon missile was first launched during the summer of 1968 at Cape Kennedy, and the Navy deemed the launch "a complete success."[390] The *Monogram* states that the Poseidon missile would be "the keystone of the Navy's nuclear deterrent for the next decade."[391]

As an offshoot of its defense work, General Electric's expertise in producing jet engines for the military helped the company in its development of commercial jet engines. In August 1962, the *Monogram* announced that, "Under contract from the Federal Aviation Agency, the Company will launch major research on designs for a jet engine which will propel commercial airliners faster than the speed of sound."[392] In order to construct such an engine, General Electric hoped to be able to use technology from the YJ93 engine, which was developed under Air Force contract for the B-70 bomber.[393] The September 1963 edition of the *Monogram* revealed that a second generation of the YJ93 engine may be powerful enough to carry out a two-hour transatlantic flight for commercial airliners.[394]

General Electric's work on a giant turbojet engine, known as the GE4 turbojet, also opened up avenues of business for the company with commercial airlines. Director

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388 "At Work On Poseidon," *The General Electric Monogram*, March, 1966. p. 8.
389 Ibid, p. 9.
390 "Poseidon's Successful Debut," *The General Electric Monogram*, October, 1968. p. 11.
391 Ibid, p. 11.
392 "The Shrinking World," *The General Electric Monogram*, August, 1962. p. 15.
393 Ibid, p. 15.
394 "The Mach 3 Business," *The General Electric Monogram*, September, 1963. p. 5.

of the project, Edward E. Hood Jr., claimed in the summer of 1966, "Successful operation of the GE4 on test and ahead of schedule substantiates our belief that it is feasible to build a long-life, low-cost, high-performance engine that can be delivered to airlines."[395] In September of 1966, General Electric submitted its proposal for the engine to the Federal Aviation Agency.[396] General Electric described its proposal as "a corporate commitment to the air transportation industry as well as the Government."[397] The company ultimately won the contract to build the engine in December of 1966, beating out competitor United Aircraft Corporation.[398] The government planned to use the GE4 to power a U.S. supersonic airliner "capable of carrying some 300 passengers from New York to London in two hours and 40 minutes."[399] The March 1967 edition of the *Monogram* states that General Electric's Evendale plant "took on the biggest competition ever to create the engines for the supersonic airliner. Financial experts said it couldn't be done."[400]

Considered to be "the biggest news of the year" for General Electric in May of 1968, United Airlines chose the McDonnell Douglas DC-10 Airbus as the plane it would use to carry passengers to their destinations.[401] The McDonnell Douglas DC-10 Airbus was powered by General Electric's CF6/36 engines.[402] Describing the CF6 engine, Edward E. Hood Jr., the general manager of General Electric's Commercial Engine Division, said, "We feel the CF6 will be the best jet engine ever to enter commercial

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[395] "Running For The SST," *The General Electric Monogram*, July-August, 1966. p. 4
[396] "Our SST Proposal," *The General Electric Monogram*, October, 1966. p. 4.
[397] Ibid, p. 4.
[398] "Supersonic Selection," *The General Electric Monogram*, January, 1967. p. 1.
[399] Ibid, p. 1.
[400] "Confounding The Skeptics," *The General Electric Monogram*, March, 1967. p. 17.
[401] "GE Powers The DC-10," *The General Electric Monogram*, May, 1968. p. 1.
[402] Ibid, p. 1.

service. We believe it will set new industry standards for low fuel consumption, long life, and ease of maintenance."[403] At the time United Airlines selected the DC-10 Airbus, General Electric was already "supplying engines to over half the business jets in the air today."[404] The selection made by United Airlines guaranteed General Electric that it would have a steady source of business in commercial aviation for years to come.

General Electric's defense work continued to benefit itself, the government, and the military between 1962 and 1970. The company's defense production by General Electric helped to supply the military with necessary combat materials for the Vietnam War, and its aerospace production helped the United States gain significant ground in the space race with the Soviet Union. Aerospace work was especially important to the government, for it did not want the United States to be perceived as less technologically advanced than the Soviet Union.

In the commercial arena, General Electric was able to establish itself as a leader in nuclear power plant production and jet engine construction. Both of these businesses spawned from defense research and development performed by the company in the previous two decades. Even so, General Electric was still hesitant to attribute its growth and success to work it had performed under government contracts.

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[403] Ibid, p. 1.
[404] Ibid, p. 2.

V. Conclusion

An established relationship between the American government and defense contractors is necessary so that the military is appropriately equipped with necessary defense materials. However, if this relationship is walled off from the public, the Military-Industrial Complex has the capability to be detrimental to American society. As Gordon Adams states in *The Iron Triangle*, "It (the Military-Industrial Complex) encourages a narrowing of views and shared expectations that another generation of weapons is both desirable and inevitable and that defense spending must rise."[405] Many of the concerns expressed regarding the Military-Industrial Complex in the literature review are completely valid. In no way should defense contractors be able to influence decisions made by government officials concerning the country's national security. Similarly, government officials should not award defense contracts for projects that are wasteful and unnecessary, and the government must be vigilant in its oversight of "cost-plus" defense contracts to assume that costs are not overstated.

In the case of General Electric, two of the sources I reviewed accuse the company of the types of abuses described above. *Bringing GE To Light* argues that General Electric promoted wasteful spending by the government on nuclear arms so that the company would increase its profits. *At Any Cost* portrays General Electric as a corrupt business that has been convicted of Pentagon fraud on numerous accounts. While these accusations are disturbing, they relate to business practices of General Electric in the 1980s and 1990s, which is not the period that my thesis is focused on.

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[405] Gordon Adams, *The Politics Of Defense Contracting: The Iron Triangle* (New Brunswick, NJ: Transaction Books, 1982), p. 207.

Through my research of General Electric from World War II through 1970, I did not find any instances where the company was accused of abusing its position within the Military-Industrial Complex. General Electric clearly competed with other defense contractors for government contracts, and likely engaged in questionable lobbying practices at times. However, pinpointing the activities and influence of General Electric lobbyists during this period is incredibly difficult. As Adams states with respect to defense lobbying, "Practices of defense contractors were inadequately disclosed" and "Available information is often inconsistently reported and poorly aggregated and analyzed."[406]

Regardless of how General Electric obtained its defense work, I believe that the company, the government, and the military all greatly benefited from working together from World War II to 1970. General Electric's defense-oriented research and development helped the United States remain a military power during this period. In part because of the efforts of General Electric, the United States military forces were equipped with the most technologically advanced equipment in the world and the country developed an arsenal of nuclear weapons and delivery systems that deterred a Soviet nuclear attack. By contracting General Electric to perform research and development related to the country's defense, the government fulfilled its obligation to protect the nation's security.

The spillover effect of General Electric's defense research and development was that the company was able to apply military technologies to commercial jet engine production and new consumer products, and was able to develop nuclear power plants to

[406] Adams, pp. 207-208.

produce electricity. These advancements benefited society as a whole, and would not have been possible without the funding provided to General Electric by the government for defense research and development. With the help of its defense production, General Electric's sales increased from $1.2 billion in 1945 to $8.7 billion in 1970.

Through my research, I would argue that General Electric should not be criticized for its role within the Military-Industrial Complex from World War II through 1970. Yes, the company may have grown at the expense of its competitors, and in its public statements, it consistently and misleadingly downplayed the benefits it gained from its defense work. However, the beneficial ways in which General Electric impacted American society outweigh these negatives.

General Electric played a key role in building and maintaining a strong American military during a critical period of the country's history. Further, many commercial products created by General Electric as an offshoot of its defense work helped to raise the American consumer's standard of living and make life more enjoyable. All in all, I view General Electric's involvement in the Military-Industrial Complex from World War II through 1970 as tremendous beneficial to the company itself, and as essential to the protection and security, of the United States as a whole.