Semiconductors & Symbolism

Thomas Stell's Ceramic Murals for Texas Instruments

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May, 2016

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Introduction

In 1958, scientists and engineers of Texas Instruments occupied an innovative new research and development facility on the suburban edge of north Dallas: the Semiconductor Building. Dedication day, with a high-voltage electronic ribbon cutting activated by a beep from the U. S. satellite *Vanguard,* took place on June 23. Dignitaries from all over the country, including Walter H. Brattain, co-inventor of the germanium transistor at Bell Labs, attended the ceremonies. Within a three-day period, employees conducted tours for over 9,000 colleagues and their families, executives gave celebratory speeches, and experts in the field offered discussions during a seminar on transistor technology.[1]

The Texas Instruments Semiconductor Building had three purposes: to house the company's ground-breaking work in the field of electronics, to communicate a message of corporate progress, and to create a new kind of suburban work environment and culture for science. Its design, by architects O'Neil Ford and Richard Colley, provided 725,000 square feet of space for assembly of new electronic products, rooms with high temperature ovens for component production, testing equipment, and scientific laboratories as well as administrative offices and areas for recuperation such as the cafeteria. At the heart of the building are four courtyards: open-air oases of sunshine, greenery, and art (Figures 1-2).[2] Providing a respite for

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[1] Caleb Pirtle III, *Engineering the World: Stories from the First 75 Years of Texas Instruments* (Dallas: Southern Methodist University Press, 2005) 98.
[2] Charissa Terranova, "O'Neil Ford's 1950s Texas Instruments building is still a haven for high-tech," *FD Architecture Design,* October 15, 2014, accessed December 29, 2015, http://www.fdluxe.com/2014/10/infinity-beyond-inside-texas-instruments.html/#prettyPhoto. Also David Dillon, *The Architecture of O'Neil Ford: Celebrating Place, (*Austin: University of Texas Press, 1999) 78-81; Pirtle, 94, 97.

the company's scientists, engineers, and other employees and combining natural materials with modern technological architecture, the outdoor rooms are warm and welcoming spaces.

Decorating these courtyards are thirteen ceramic wall hangings designed and crafted by Texas Regional artist Thomas Matthew Stell, Jr. (Figures 3-8)[3] Their soft colors and appealing textile finishes complement the pinkish brown bricks behind them and contrast with the angular, high-tech architecture. Their shapes and line direction are varied. The subject matter is a melding of human, natural, and technological imagery: employees at work, organic shapes, scientific symbols, innovative machines, and other references to the world of Texas Instruments.

Together with the architecture, these artworks emblematically represent the company's identity. Stell's interpretation, guided by executive Patrick Haggerty, characterized the business of science that placed TI in a position of success since its founding in 1930.[4] Made up of a composite of symbols for equipment and products, the art represents TI's past scientific development and their capitalistic ventures through not only subject matter but also by their unusual presentation. The pieces are scattered around the open-air wall spaces as if they are archeological fragments holding glimpses of the company's past. Like puzzle pieces of something larger, they were placed in courtyard spaces and surrounded by other pieces of the puzzle. Exposed layers of the building revealed by the courtyard spaces show technology, crafts, nature, and the earth, as if an exploration mechanism had taken a core sample of this

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[3] Dillon, 81-82; Kendall Curlee, "Stell, Thomas Matthew, Jr.," *Handbook of Texas Online,* accessed February 12, 2015, uploaded on June 15, 2010, http://www.tshaonline.org/handbook/online/articles/fstbe. Also, information from interview with Andy Timmer, Texas Instruments Semiconductor Building Facilities Manager, Dallas, January 27, 2015.

[4] The company was originally founded with the name Geophysical Service Inc. In 1951, the name was changed to Texas Instruments Inc. to more clearly reflect all their divisions. See Pirtle, 5, 57.

architectural structure to make the contents clear. The shapes of the plaques at times echo the architectural angles of the building and machines within and, other times, the organic nature of the substances used in TI production. By their unified design, the architecture and art give meaning to space and vice versa. This blending of nature and technology repeats Ford's tendency to combine organic materials in hand-crafted objects with high-tech architecture, a signature characteristic of his style. As a setting for Stell's creative handwork, the space is a unified whole, promoting the company as a viable and progressive business.

By bringing these artworks out of obscurity for examination by art historians, this paper argues that Texas Instruments used the artwork and the architecture surrounding them to promote and portray a cutting edge business with roots in Texas. Their style places them within a distinctive regional artistic and economic culture, situating the state and hence, the company, as a progressive center of corporate art patronage in the post-war period.

Existing scholarship describes this phenomenon as it concerns other corporations, but, until now, a complete analysis of Stell's ceramic plaques and their meanings for Texas Instruments, the relationship of the art to the building, and the connection to other contemporary businesses has not been completed. Using primary resources such as the art and architecture itself, documents from the files of the company, letters and diaries; and secondary sources such as analyses of other companies' use of art for promotion purposes, this paper strengthens recognition of certain trends and places Texas companies within those trends.

Texas Instruments Historical Background

TI's history reveals a whirlwind growth. Innovation was a hallmark since its founding. Originally named Geophysical Service Inc. (GSI), the company sent oil exploration crews around the world as early as the 1930s and developed "an international mindset."[5] In spite of the Depression, the business grew. GSI, and then later TI, brought about long term contracts with government owned oil companies; and in the early 1940s, the company created equipment for detecting submarines. Defense contracts obtained during World War II maintained financial solvency for the small corporation. In 1953, Texas Instruments was able to enter the New York Stock Exchange, and in 1954, TI introduced the first commercial silicon transistor, leading to the manufacture of the first transistor radio and recognition within the industry. Shortly after Ford's Semiconductor building was occupied, TI inventor Jack Kilby produced the first integrated circuit – "the chip that changed the world" – for which he received the Nobel Prize in Physics.[6]

The development and manufacture of electronic products resulted in capital gains for TI. Haggerty had long dreamed of financial success. In 1948 while the company was producing these electronics out of a vacant bowling alley building, he foretold his vision. With $5 million in total sales, he said, "We are a good, little company. Now we must become a good, big company." When asked what that would mean, he answered, "Around $200 million in sales."[7]

Haggerty knew that Texas Instruments needed more space for these efforts, especially for the development and production of semiconductors, and he wanted that space to impress

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[5] Pirtle, 9. TI exploration and survey crews were sent to Sumatra, Mexico, Venezuela, Ecuador, Colombia, Panama, Brazil, India, and Saudi Arabia, among others.
[6] Ibid., 32, 62, 107, inside cover, 28, 73, 81. Also, see www.ti.com/tihistory.
[7] Pirtle, 32, 94.

upon the public that Texas Instruments, specifically, and Texas in general, were no longer outposts of the electronics industry. Technological advancements had shown it to be a stronghold.

Many decisions and events led up to that realization. In the fall of 1951, Western Electric, who held the patents for the transistor, released licenses to paying companies. Produced from a substance called germanium, this small device replaced vacuum tubes in its capabilities as an electricity conductor. Texas Instruments was one of the first to send a check for $25,000 to Western Electric, allowing them to attend a symposium arranged by Bell Laboratories in Murray Hill, New Jersey, and gather information for further experimentation and development. TI joined thirty-eight other companies at Bell Labs for this technical training opportunity.[8] Throughout much of 1952 and 1953, the team of TI researchers worked tirelessly to design and build equipment and refine the process of growing germanium, and then, silicon crystals for use in production of transistors. The growth of the crystals is essentially a chemical-metallurgical process (Fig. 9).[9] Once the substance was available, employees required patience, dexterity and the use of microscopes to hand-assemble these small products (Fig. 10).[10]

Patrick Haggerty had gathered the best educated minds concerning transistor technology, who in turn succeeded in producing the tiny components. In 1954, the senior scientist of the team, Gordon Teal, surprised the electronics industry by presenting the improved silicon transistor to a conference in Dayton, Ohio. Many leaders of the community had prophesied that production of this object would not be accomplished for years, and yet

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[8] Harris, "The Battle of the Components," *Fortune,* May 1957, 138.
[9] Ibid.
[10] Pirtle, 58-61, 66.

Teal pulled several of these devices from his pocket and demonstrated to an astonished audience the improved capabilities of the silicon transistor. One excited member of the audience made a quick phone call back home to exclaim, "They've got the silicon transistor down in Texas." In a history of the company, Caleb Pirtle summed up this rapid growth: "Texas Instruments had become the industry leader."[11]

In May of 1957, *Fortune* magazine published an article about the semiconductor market, proclaiming that, in ratings, "Texas Instruments, a little-known company, is placed first by a comfortable margin."[12]

Texas Instruments showed time and again that one of their policies was the consistent interaction between researchers and administration. Indeed, the leaders in the company all had engineering backgrounds and consistently participated in the scientific aspects of the business.[13] They also gathered researchers and middle management personnel from other companies when possible. Mark Shepherd, an engineer who became management, was recruited from Farnsworth Company in Fort Wayne, Indiana. Gordon Teal was lured away from Bell Labs in New Jersey.[14] Throughout the industry, well trained technological employees were vigorously recruited from academic as well as commercial environments using amenities such as pleasant surroundings, efficient laboratories with up-to-date features, and conveniently

[11] Ibid., 65-67. Quotes on 67.

[12] Harris, "The Battle of the Components," 138. Also, see Pirtle, 61.

[13] Pirtle, Chapters 2, 4 and 18, among others. Also, see "Founder's Biographies," *Texas Instruments,* http://www.ti.com/corp/docs/company/history/mcderm.shtml, accessed 12-11-14, for biographical data about founders of TI.

[14] Pirtle, 32-33, 65-66.

located cafeterias.[15] Rising stars, especially in middle management, sought prestigious facilities to "valorize the industrial scientist, and validate the use of science for profit."[16] Teamwork and transference of knowledge in laboratories, as could be found within corporate enterprise, was another desirable attribute.[17] When people moved, they carried with them knowledge of science, company structure and physical surroundings.

Patrick Haggerty would have been aware of these corporate trends due to visits to other campuses and accessibility of public and private publications. He would have seen that regional and local corporate leaders during the mid-twentieth century understood the benefits of public art. Integrating attributes of a company's production into their public image, cultivated through art and architecture, was apparently a sign of the times.

TI advertisements of the era also helped to assert their place in the national industry of electronics. One ad displayed the silicon transistor against a desert landscape (Fig. 11).[18] Meg Miller explains that the sand in the desert relates to silicon and that "The desert backdrop was meant to convey that Texas Instruments was a new heavyweight in the field and that the tech industry was pushing westward."[19] The words "sand … heat …and silicon transistors" at the bottom of the image also refer to the process of manufacturing. Molten silicon required 1400

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[15] For various explanations of recruitment policies, see Prelinger. For discussion about this trend of shifting personnel among contemporary industry, see Louise A. Mozingo, *Pastoral Capitalism: A History of Suburban Corporate Landscapes* (Cambridge, Massachusetts: The MIT Press, 2011).

[16] Mozingo, 12, 22, 23.

[17] Ibid., 51.

[18] Megan Prelinger, *The Machine: Art and Invention In The Electronic Age (*New York and London: W. W. Norton & Company, 2015) 90.

[19] Meg Miller, "The Fantastically Geeky Ads That Gave Rise to the Tech Industry," *Co.Design,* accessed March 1, 2016, http://www.fastcodesign.com/3050586/the-fantastically-geeky-ads-that-gave-rise-to-the-tech-industry/11.

degrees Celsius for uniform growth.[20] In the ad, the transistor is juxtaposed over the vacuum tube to show that it was the next step in electronic development for objects that channel the flow of electrons.[21] Megan Prelinger expands this concept:

> That is the science of electronics, the process of controlling the flow of electrons, the constituent elements of an electrical charge. The *technology* of electronics is the application of this science toward useful purposes.[22]

The text from the ad also tells the reader to "Keep an Eye on TI," a message alerting the industry that the company was worthy of notice.[23] This campaign helped to situate TI as a Postwar electronics company with a future in semiconductors.

To house the new operations and further improve the image of Texas Instruments as a strongly contributing member of the technology industry, Haggerty also chose a creative team -- O'Neil Ford, Richard Colley, and Thomas Stell -- whose artistic vision and proven work matched his outlook on modernity. Haggerty was introduced to Ford by his colleague Eugene McDermott. Ford had been collaborating with Colley on some schools in South Texas. Stell, who had known and worked with Ford in Dallas during the 1930s, had been teaching at Trinity University and the University of Texas in Austin. After Ford brought the other two men to the attention of Haggerty, they would altogether promote the public's idea of the company with elegant, high-tech, architectural design and symbolic, hand-crafted art that would reflect the surrounding culture of Texas.[24]

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[20] Pirtle, 67.
[21] Prelinger, 24. The "steps in the ability of people to channel the flow of electrons" were vacuum tube, transistor, circuit board. Another comparison began with the light bulb before the vacuum tube, 13.
[22] Ibid., 35. Italics from original text.
[23] For another ad promoting TI's growth, see also, "Computers and Software Ads of the 1950s," *Vintage Ad Browser,* accessed March 1, 2016, http://www.vintageadbrowser.com/computers-and-software-ads-1950s/4.
[24] O'Neil Ford diaries entries concerning meetings with Haggerty, especially June, 1956, and August 10, 1957. Also, Mary Carolyn Hollers George, *O'Neil Ford, Architect* (College Station: Texas A&M Press, 1992) 121. Dillon, 77-78.

Stell and Texas Regionalism

Representing Texas and its culture had been the goal of Dallas artists, including Ford and Stell, since the 1920s. A group called the Dallas Artists League, led by a young painter named Jerry Bywaters, supported the message of a "manifesto" written by Henry Nash Smith. Published in the *Southwest Review* in 1928, it urged artists "to relate themselves to their specific environment," "draw inspiration from their own roots," and to gain an "understanding of their own times and places." These artists were establishing a distinct artistic tradition that came to be known as Texas Regionalism.

Within the art of the Dallas Circle, there were certain recurring characteristics. The most common that was obvious in their work and mentioned repeatedly in their writings was the importance of connecting to their environment. Bywaters wrote in an article for the *Southwest Review* in 1938 that "art, to be significant, must be a reflection of life; that it must be understandable to the layman; and that it must be part of a people's thought."[25] Smith, the author of their "manifesto" stressed that "the secret of culture is an awareness of the immediate environment and a sense for the value of everyday things."[26] Many times, that meant incorporating the immediately surrounding environment.

Another characteristic of these Dallas Texas regionalist artists was the tendency to simplify. Influenced by primitive, or folk, art, they strove to reduce objects to the formal

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[25] Rick Stewart, *Lone Star Regionalism: The Dallas Nine and Their Circle 1938-1945* (Dallas: Texas Monthly Press/Dallas Museum of Art, 1985), 21.
[26] Ibid., 23.

elements of line, volume, and color. Alexander Hogue, one of the more famous members of the group, produced Depression drought scenes with neatly placed components of the landscape used as symbols for the desperation of the times. Another artist of the Dallas Circle, Otis Dozier, painted an imposing image of a cotton plant, "a symbol, set icon-like against the level fields and distant horizon (Fig. 12)."[27] One method of simplifying was to reduce subject matter to the formal elements.[28]

Color was another unifying element of these Dallas artists. In 1936, the current director of the Dallas Museum of Fine Arts, Richard Foster Howard, compared the colors of the Texas regionalists to the Texas land. The phrase "earthiness of color" repeatedly appeared in descriptions of their art. A New York critic, Emily Genauer, summarized their use of the formal elements as "something tight, tense, arid."[29] Altogether these methods resulted in a stylized realism, or mild abstraction.[30] Texas regionalists were more concerned "with experimentation in ideas and forms than in illustration," "with essences, not actuality."[31] Their use of color supported these ideas.

Correlating artistic ideas of the 1930s had been carried forward by Jerry Bywaters and other artists as they continued to establish what was regional in Texas art.[32] What that meant was debated for most of the decade. In her writings about the development of thought, Francine Carraro summed it up in this way: "In its broader sense the regionalism of the 1930s was an honest effort to record, examine, and interpret familiar subject matter in purely artistic

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[27] Stewart., 45, 63-64, 85. Quote found on 63.
[28] Ibid., 34.
[29] Ibid., 106, from *New York World Telegram,* April 29, 1939.
[30] Ibid., 94, 189.
[31] Ibid. 59, from *Dallas Journal,* January, 1936. Also, 113.
[32] For a complete discussion about this idea, see Francine Carraro, *Jerry Bywaters: A Life in Art (*Austin: University of Texas Press, 1994).

terms and to achieve a national artistic identity by those means."[33] The concept was beginning to have substance.

O'Neil Ford gained access to this group through his working relationship with David Williams, "the first Texan architect to engage regionalism as a systematic project."[34] During the 1920s Williams hired Ford to work with him in his Dallas office. Separately and together, they traveled to South Texas to investigate vernacular forms of architecture, sketched what they saw, and subsequently wrote their findings for *Southwest Review,* a journal that served as a platform for identifying what was considered regional. Their focus was design seen in the marginal subcultures and in their structures. This included decisions of arrangement and construction that often originated due to climatic needs. Instead of drawing from European influences or adaptations filtering through the Northeastern United States, as many architects of the time were choosing to do, they looked toward structures built by original Texas settlers – buildings that included simple forms, native materials, and practicality.[35] Ford's collaborator when he later designed the Texas Instruments building was Richard Colley, another architect who, during the 1940s, had used regionalism, adapting native Hispanic features to reclaim difference in his design for a church in Corpus Christi.[36]

As a friend and collaborator of the architects and artists who gathered in studios and living rooms at the time, Tom Stell absorbed many of the ideas of the Dallas Circle.[37] In his writings, he commended Texas artists for replacing "picturesqueness" with "a healthy concern

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[33] Carraro, 91.
[34] Stephen Fox, "Regionalism and Texas Architecture," in *Architectural Regionalism: Collected Writings on Place, Identity, Modernity, and Tradition,* Vincent B. Canizaro, Editor (New York: Princeton Architectural Press, 2007) 204-212. Quote from 209.
[35] Carraro, 38. See also, George, 17-19. Fox, 209-212.
[36] Fox, 210.
[37] Carraro, 53.

for line, volume, and rhythm."[38] Texas Regionalist techniques and concepts were evident in his work for the rest of his life. Stell was a painter known for portraits and murals (Fig. 13). Born in Cuero, Texas, and educated at Rice Institute and then the Art Students League in New York, he trained with muralists, Julian Garnsey and Augustus Vincent Tack. He also earned an MFA from Columbia University. Upon returning to Texas, he taught at the newly formed Art Institute in Dallas and produced many individual commissioned portraits and murals, including one for a Dallas high school in 1934 and three WPA post office murals in Texas and Oklahoma completed in the late 30s and 40s (Fig. 14).[39] When the City of Dallas celebrated the Texas Centennial, Stell was part of a team that painted murals on the buildings at the State Fair grounds.[40]

Interestingly, this painter departed from his usual media during the 1950s to produce clay mosaic wall art for the TI Semiconductor Building. Working in conjunction with Ford, who favored organic three dimensional materials, he adopted clay as a medium. He used strong, formal elements to interpret the subject matter. After creating the ceramic wall hangings for TI, he went on to design several mosaic artworks portraying Native American myths for the Tower of the Americas and another mosaic for the Riverwalk Project, all in San Antonio.[41]

Characteristics of Texas Regionalism appear in the artwork produced for Texas Instruments by Thomas Stell. Most of his life was spent in Texas, and his artistic formation and output included influence from this regional heritage. Although Stell resided in South Texas by

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[38] Ibid., 34, from article, "Texas Fine Arts Association Exhibit," in *Contemporary Arts of the South and Southwest* 1 (November-December 1932) 6.

[39] Rick Stewart, 20-21,26,188. Also, see "Major Works: Thomas M. Stell."

[40] Docent conversation, information gathered during field work at the State Fair Grounds of Dallas, January 23, 2016, and confirmed through an April 12, 2016 email from Wendy Cole, archivist of the Dallas Historical Society. Also, Stewart, 37.

[41] O'Neil Ford, notes to Jerry Bywaters Special Collections, Hamon Arts Library, Southern Methodist University, Box 53: "Texas Art/ Texas Artists/Ford,O'Neil/Correspondence." See also, Stell biography, Stewart, 188. Information about the Tower of the Americas mosaics was retrieved through author's field work, 2015.

then, he continued to connect to the Dallas Circle through work and friendship, and he continued to align his artistic decisions with theirs.[42] When Stell used the natural substance of clay for the three dimensional technique of bas relief plaques in 1958, he formed a connection to the handcrafted products promoted by Ford.[43] It was an obvious use of a native material without disguise, without refinement. The importance of applied arts had been a part of Ford's life since childhood, but it was especially integrated into his architectural designs due to influence from his mentor, David Williams. Their interpretation of a "native regional style for contemporary buildings" included this integration.[44]

TI's Goals: Art and Science

By working with Stell and Ford, Patrick Haggerty took advantage of these Dallas regional artistic traits to realize his dream of creating a modern, but distinctively Texan image for his company. He had been an aggressive and aesthetically aware leader within TI since 1945. Before plans for the Semiconductor Building were confirmed, he actively made decisions about another plant built in Houston.[45] He consistently promoted building successes through corporate correspondence, speeches, publications and also through art and architectural design. Haggerty made a statement expressing TI's philosophy for the August 1956 issue of the employee newsletter *Texins*, which was dedicated entirely to the plans for the new Semiconductor Building:

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[42] George, 83, 92, 153; Dillon, 85; Carraro, 209.
[43] See Dillon and George for complete listings of Ford's work and explanation of his style. Specific reference to influence of David Williams concerning native materials on page 20 of George.
[44] George, 20, 22.
[45] Journals of O'Neil Ford, 1958, O'Neil Ford Collection, Alexander Architectural Archive, University of Texas Libraries, The University of Texas at Austin. Especially, see entries for March 28, May 2 and June 21, 1956.

> You can't just construct buildings to work in. They must be designed for their purpose … for people and machines. They must be good art as well … must express the company, its people and the society of which they are a part. It is our sincere desire that this first building and the entire development be a source of pride to the community and to our people.[46]

In this, he was following a trend in corporate design being carried out by other technology companies that were relocating and building corporate campuses.

During the 1940s and early 1950s, many organizations, including Bell Telephone, General Motors and International Business Machines (IBM), expanded their facilities. Louise Mozingo described this trend: "Corporations were no longer confined to the manufacture and sale of commodities; they had to market themselves in several ways." A prominent image could impress investors, attract and retain skilled executives, bond with employees, and reassure the public.[47]

Unique to the goals of TI's founders was the creation of an important company with its identity grounded in Texas. In 1951, when the company required restructuring due to growth in both manufacturing and exploration, Pat Haggerty led a committee that chose a new name in order to reflect the company's focus, culture, and direction. One of the directives from the current president, Erik Jonsson, was that the name include the word, "Texas." Their offices and banking business had been in Dallas for two decades. Due to a growing recognition among the leaders in the industry nationwide, it was important to TI executives to connect to the land and myths of Texas and to set up a distinctive identity forged with those links. Although the founders and early leaders of the company were not originally from Texas, they had adopted

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[46] *Texins for the employees of Texas Instruments Incorporated*, August, 1956, 4. This newsletter was published monthly by Texas Instruments in Dallas beginning in 1953, Pirtle, 31, 211.
[47] Mozingo, 102.

the state and felt that its image of grandeur could work in their favor if connected to their growing business.[48]

The next stage in forming this identity was new art and architecture. Haggerty worked closely with Ford and Stell to produce the resulting combination, the TI Semiconductor Building in Dallas. A declaration of the company's growing progressive and sophisticated image, it also clearly reflected regional, modern, and corporate trends. At the heart of this effort were the interior courtyard spaces.

Courtyard Design and Hyperbolic Paraboloids: A Setting for Stell's Art

The company chose to incorporate green space in the plan of their new building with inward views rather than outward views.[49] Architect O'Neil Ford espoused the opinion that glass curtain exterior walls were impractical, especially in Texas, due to difficulty in regulating and controlling temperature. He preferred the energy conscious choice of sheltered interior courts.[50]

The northernmost courtyard, called an atrium by Texas Instruments staff, is covered with a skylight and includes an architectural model and two renderings of proposed design ideas by the architect, Ford. Stell's artwork was placed in the next three courtyard areas, in dialogue with Ford's craft-oriented, but technologically advanced, Texas regional modern style (Fig. 2). The spaces are a play of soft colors and textures, juxtaposed with innovative structural

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[48] Pirtle, 5, 12-14, 56-57. See D. W. Meinig, *Imperial Texas: an Interpretive Essay in Cultural Geography* (Austin and London: University of Texas Press, 1969) for background on the cultural influences of early Texas.

[49] The expansive suburban acreage around the Semiconductor Building later provided plenty of room for other needed buildings. At present, the site includes over thirty large buildings and yet is shielded from the highway interchange due to large peripheral shrubbery.

[50] Janet Kutner, Art Editor, "Architect O'Neil Ford: In history, a direction" The Dallas Morning News, May 21, 1978, page 1G. Also, Maggie Kennedy, Staff Writer, "He's the best but we don't know it," Dallas Times Herald, May 26, 1978, 4.

elements. The clay plaques are mounted on exterior walls of a warm pinkish brown brick above pastel gravel and walkways covered with polished wooden boards. Planting areas include large trees and shrubs. These textured, natural surfaces surround seating areas – benches, tables, and chairs.[51]

Within this environment, in addition to the plaques and brick of the courtyard, employees and visitors see contrasting high technological features. Revealed through glass panels are the hard-edged, structural innovations of the building -- a hyperbolic paraboloid roof and the "space frame" on the second floor, all described below.

The roof is an undulating concrete slab construction put in place as an economical solution to the client's need for future expansion (Figures 15 & 16). Set on sixty-three-foot-square spans, the tent-like design allows for efficient additions of space without changing the overall exterior visual impact or the interior coordination of manufacturing and laboratory requirements.[52] Evidence of the success of this design shows forth in a quote by Patrick Haggerty. In 1965, seven years after the building's first phase was completed, he said of the Semiconductor Building,

> "In the first two years of occupancy, there were about 250 new installations and approximately 650 moves requiring work on services … but no floor or wall openings, no structural or major building changes had to be made to accomplish these moves and installations."[53]

The hyperbolic paraboloid roof was modeled after developments by Felix Candela, the Spanish exile architect working in Mexico, and was previously used by O'Neil Ford in the Great

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[51] According to Kristen Haubrich, current Facilities Manager of the Semiconductor Building, the courtyards were improved during the 2001 renovation. Interview October 15, 2015.

[52] Texas Instruments file, Box 92-82 RG19 Photographs: SC Bldg. product lines, other unidentified co. 1960s, DeGolyer Library, Southern Methodist University. Captions over corporation owned photographs provide information. See also, Dillon, 77-80. Also, Pirtle, Chapters 27 and 28.

[53] Pirtle, 97.

Southwest Industrial District located in Arlington, Texas. According to the text on the back of a 1950s postcard picturing the complex, this "concrete umbrella construction form" was pioneered in the United States with its use in the Great Southwest design by O'Neil Ford.[54]

The underside of the hyperbolic paraboloid roof at the Texas Instruments Semiconductor building can be seen through the courtyard windows. These thin slabs of concrete alternatively peak and slope downward repeatedly throughout the building, creating interesting areas of space and overlapping shadows. Visually juxtaposed with Stell's art pieces, this architectural technology is only one of two significant innovations Ford included in the structure.

The second one can also be seen through the courtyard windows. For the second floor, Ford created what is often referred to as a "space frame," another reason the building was flexible when it came time to add laboratories (Fig. 17). Visually, the structure of the second floor with its strong diagonals echoes much of the line direction in Stell's art. Viewed through the windows from the open courtyards and appearing sculptural, the white forms coordinate in shape and line direction with the ceramic plaques. In practical terms, however, they have a more scientific purpose. Housing thirty-eight different types of conduits for the variety of substances required by the building's operations -- water, rare gases, electricity, and waste removal -- this space measures nine feet in height, as opposed to more traditional smaller utility areas, in order to allow for easy access by personnel. Supporting the third floor with

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[54] "Unprocessed David Dillon Collection" Box 6 [accession number] 2011-71 O'Neil Ford," Letter of review of the Ford biography, *The Architecture of O'Neil Ford: Celebrating Space,* signed Boone Powell, April 8, 1996: Page 314, Line 4, University of Texas-Arlington Archival Library. See also, Paula Bosse 2014, "The Hyperbolic Paraboloids of the Prairie," *Flashback: Dallas,* accessed October 8, 2015, http://flashbackdallas.com/2014/04/15/the-hyperbolic-paraboloids-of-the-prairie/. For information about Candela's previous use of hyperbolic paraboloids in Mexico, see "Miriam and Ira D. Wallach Art Gallery: Félix Candela: 1910-2010," *Columbia University in the City of New York*, accessed October 8, 2015, http://www.columbia.edu/cu/wallach/exhibitions/Felix-Candela.html.

inverted V-shaped concrete tetrapods, this interstitial space was a problem-solving method that had not been seen in previous industrial architecture.[55]

Along with the high tech architectural advancements throughout the building, Ford's signature adherence to crafted surfaces and objects provides a notable but consistent contrast. Inside the lobby entrance, placed behind the receptionist's desk, is a wooden plank screen produced by O'Neil Ford's brother, Lynn. Each piece of wood is carved with a different pattern of geometric forms (Fig. 18).[56] A prominent wall text introduces the artwork to observers by naming the artist and his connection to the architect. This piece of artwork was located in the original lobby of the building and was preserved and resituated during a renovation of the first floor in an attempt to maintain the architect's original purpose of presenting crafts along with technology of construction.[57]

Other reminders of the choice made to reinforce an image of craftsmanship are the decorative lighting fixtures hanging in a short hallway leading from the original entrance of the building. Made of perforated ceramic by Martha Mood, these flared cylinders with subtle coloration are mounted on the ceiling, contrasting with the sleekly styled surroundings (Fig. 19).[58]

O'Neil Ford preferred the natural materials used in these hand crafted objects, the bas relief ceramic plaques by Stell, and the brick, wood, and marble of the building itself. Other natural materials – oil, germanium, silicon -- were important in the development of the corporation's scientific work housed by the Semiconductor Building. The connections were not

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[55] Terranova. Also, George, 131.
[56] Information retrieved from Andy Timmer interviews, January 27, 2015 and March 3, 2016.
[57] Ibid.
[58] A plaque with information about these lighting fixtures hangs in the TI hallway.

lost on the decision-making executives. Haggerty and other executives who attended planning meetings discussed details with Ford. He also communicated directly with Stell. After recommending Stell to Haggerty, Ford wrote in his journal that he hoped they would get along well and later mentioned, in relief, that he felt they did.[59] Haggerty, acting executive for this project, continued that relationship due to his interest in artistic materials and techniques. This was consistent with his earlier interest and involvement with the development and production of the electronic components that were to be produced in the building. He kept a close eye on the work that Gordon Teal and his team were doing as they developed the silicon transistor in the 1940s.[60] His attention to detail was evident in both scientific and artistic matters, and his aesthetic interests had been honed by watching an emerging art that was being developed to represent objects in his industry.

Haggerty's Direction for Stell's Artwork

Patrick Haggerty had doubtless seen advertisements about electronic products in business publications. Many items produced for electronics companies were only sold to other companies, rather than to the general public, "as many of them manufactured only component parts, not finished products."[61] To learn about possibilities for product development, executives were required to read magazine articles and advertising. The technology of the electronics industry was moving "too fast for traditional business-to-business formats such as quarterly or annual catalogs."[62] As Haggerty reviewed these publications, he was exposed to the developing

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[59] O'Neil Ford journals, O'Neil Ford Collection, Alexander Architectural Archive, University of Texas Libraries, The University of Texas at Austin, especially entries for 5-24-57, 5-27-57, 1-11-58.
[60] Pirtle, Chapters 16 and 18.
[61] Prelinger, 16.
[62] Ibid.

artistic abstract symbols and realistic images of electronic devices and processes. Art was being created to describe and explain new technologies to potential purchasers and then presented in magazines, research pamphlets, and manuals.[63] The TI executive with sensitivity to aesthetics as well as science was absorbing visual information from many sources.

The story behind the ceramic wall hangings also reveals Haggerty's philosophy concerning the placement of art within industrial environments. One of Ford's biographers, David Dillon, described Haggerty as unusually insightful in that he desired more than just efficient housing. He wanted "humane environments that raised the spirits of everyone who entered them."[64] In a *Dallas Times Herald* article of 1965, Haggerty reiterated his belief that a building should express the over-all character of an institution.[65] As early as 1954, Haggerty began to fulfill this philosophy. After seeing the collaborative work of Ford and Colley in San Antonio the year before, he chose them to design a building for a newly purchased subsidiary, Houston Technical Laboratories (HTL).[66] To accommodate expected growth and rearrangement, the architects chose a flexible floor plan that included moveable interior walls. In keeping with Haggerty's concern for encouraging personnel through surroundings, the architects also chose an artistic touch for the Houston plant -- an abstract geological mural designed by San Antonio artist Cecil Casebier and framed by a small courtyard (Fig. 20). During meetings with Ford and Colley, he critiqued details such as the designs for entrance doors. It was noted by another biographer, Mary Carolyn Hollers George, that Haggerty was pleased with these aesthetic

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[63] Ibid., 22, 247. Prelinger presents the interaction of technology and art and the possible influence of scientific experimentation and its resulting images on the development of abstract art.
[64] Dillon, 79.
[65] "City Beautiful?" *Dallas Times Herald,* 27 June 1965, C7. Information retrieved from a footnote in Dillon, 146.
[66] George, 122-122.

additions.[67] Dillon proclaimed that the choices for the HTL building "set the standard for TI facilities for a decade."[68] The Dallas Semiconductor Building continued to fulfill that standard.

To further carry out these aspirations, Haggerty worked closely with Thomas Stell to produce the public art for the SC building. His close collaboration with the artist is revealed in a series of twenty drawings preserved in TI company archives (Figures 21-24). In pencil, Haggerty sketched mechanical and scientific equipment from the operations of Texas Instruments semiconductor production and even indicated desired color schemes. By choosing these particular objects, he was advertising to viewers that TI had progressed rapidly in their field. They had built machinery when it was not available, assembled equipment necessary, and created improved products that other companies were not yet making.[69] These products could not have existed without the equipment illustrated in Haggerty's sketches and reiterated, abstractly, in Stell's ceramic mosaics. By displaying an abundance of components, the ceramic wall hangings also hint at Haggerty's pride in scientific and economic successes. Stell adapted and re-combined shapes, symbols, and whole components. Placing elements from Haggerty's drawings on the clay plaques, Stell created, in fragments, a visual representation of Texas Instruments' achievements as they developed semiconductors.[70] The plaques pictured TI as an established part of business history and as an innovative, forward thinking, and active organization.

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[67] Ibid., 122. Also, see Ford's journal entries, 1956.
[68] Dillon, 78; George, 122.
[69] Pirtle, 67.
[70] Information from interview with Timmer, January 27, 2015. Also, recognized by examining drawings and photos from files of Texas Instruments Real Estate Offices, provided by Lisa Holomshek, Project Manager, Texas Instruments, WW Facilities - Design, Sales & Real Estate, via email March 3, 2015.

The clay objects Stell created remind viewers that human hands and minds initiated the development of even the most scientific apparatus and products of the company; but at the same time, they represent the financial success of the company. Besides the process of formation and the aesthetic qualities, the very substance of clay was similar to those used in TI manufacturing. A plastic, pliable matter, it could be likened to the germanium and silicon used in production of transistors and other commodities sold for profit. Capable of being formed, assembled and baked in ovens to harden, these substances possess unmistakable similarities.

Scientific and Artistic Process

The process of making the art was also organic, changing as it developed, just like the progress of invention used by scientists in the laboratories of Texas Instruments, or the evolving growth of the company. The concepts of meandering thought during scientific experimentation or artistic creation and the complex formation of matter found in both the process of Stell's art and TI's invention of new products could be likened to the snake-like line direction often chosen by Stell in the plaque's design.[71]

An example of the process of scientific experimentation is evident in the story of the integrated circuit invented by Jack Kilby in 1958. He had been investigating miniaturization and cost reduction in production and assembly of electronics while working with another company, Centralab. When Western Electric offered licenses for producing transistors, he turned his attention to improvement of point-contact transistors and other forms of transferring electrical currents, such as resistor-capacitor networks and ceramic-based silk-screened circuits. Unhappy

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[71] For detailed information about clay sculpture formation, see "The Sculpting Process," *Tizzano Sculpture,* accessed April 14, 2016, http://www.tizzanosculpture.com/the-sculpting-process.php. For a description of the development of thought involved in invention, see Pirtle, 81-83, and described in this paper in the next section.

with Centralab's goals and eager to work again with miniaturization experimentation, Kilby sought a new job and was hired by Texas Instruments. Ideas about a module approach within product design were being examined by TI, but Kilby "wanted to see if repackaging the circuits might be a better alternative."[72] Because he did not believe that micro modules were the best solution, he designed a tubular amplifier but discovered it was not cost effective. While most of the company was out for summer vacation, Kilby began to think about what the semiconductor plant could economically produce. He drew some sketches for silicon circuits that had many purposes, including resistors and capacitors. Finally, he "integrated all the components into a single bar of semiconductor material."[73] This tiny product transferred electric current in an efficient method and proved to reduce costs when manufactured. Its uses in computers, missiles, space vehicles, and later consumer products increased the world market of electronic systems from $24 billion in 1960 to $1,175 billion in 2004. In his history of TI, author Caleb Pirtle described the mental process that led up to the product:

> According to Jack Kilby, an inventor has to define a need or problem, have the proper knowledge of those technologies or the techniques available for reaching a positive solution, then develop a specific product or structure that allows him to select the right technologies necessary to achieve the desired result.[74]

In Kilby's notebooks, he documented every idea and experiment, even those that did not work. He made color coded notations to show sequence, thought carefully about every new idea, and built objects when inspired. In his own words, "Engineering, or at least good engineering, is a creative process."[75] Exploration is the method by which inventions become manifest.[76] For TI,

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[72] Pirtle, 81.
[73] Ibid., 82.
[74] Ibid., 83.
[75] Ibid., 83.

as in the entire technological field, this is a part of a larger process of scientific discovery that continues throughout time.

The creative mental process is present across many fields. Working artists use exploration, sometimes trial and error method, or systematic steps toward completion of a project. Developing thoughts at times move quickly, and other times, slowly. Inspiration can come from unexpected sources for artists as well as scientists.

Organic Forms

During the 1940s and 50s, there was often a direct correlation between science and art. As science discovered smaller and smaller parts of substances through photography and microscopy, artists “were more directly inspired … to explore its heretofore hidden organic forms.”[77] This idea of the use of organic or biomorphic forms that “suggest a nature undergoing constant change” was presented in a series of exhibits at the Brooklyn Museum of Art beginning in 1979.[78] Third in the series was *Vital Forms: American Art and Design in the Atomic Age, 1940-1960* which opened in 2001. Essays from the accompanying catalogue analyzed the connections between styles such as Surrealism, Italian Futurism, Constructivism, and Cubism to scientific discoveries and discussed the organic, or living form, and the biomorphic forms that “emerge from the shape of the living body.”[79] Gordon Onslow Ford, an American artist working during the early twentieth century described his Surrealistic compositions with words such as

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[76] Prelinger, 12.

[77] Brooke Kamin Rapaport, “The Greater Mystery of Things: Aspects of Vital Forms in American Art” in *Vital Forms: American Art and Design in the Atomic Age 1940-1960* (New York: Brooklyn Museum of Art in Association with Harry N. Abrams, Incl., Publishers, 2001) 91.

[78] Arnold L. Lehman, “Foreword” and Kevin L. Stayton, “Introduction,” both in *Vital Forms: American Art and Design in the Atomic Age 1940-1960* (New York: Brooklyn Museum of Art in Association with Harry N. Abrams, Incl., Publishers, 2001) 17, quote from page 35.

[79] Stayton, 27. See also Prelinger, 95-96.

“interconnectedness” and phrases such as “express a concept of space-time; to paint things felt but not seen.”[80] Lee Mullican, an abstract artist who had spent time drawing topographical maps during World War II, expanded this concept even more specifically:

> It’s based on cosmic ideas, introspection, things under a microscope … All of this is a world that people don’t really see. You can’t walk into that, walk into nebulae, walk into constellations, and a lot of that is what I create. It’s a matter of tuning in.[81]

An example of a New York artist who produced paintings with organic forms is Charles Seliger. His 1944 work titled *Cerebral Landscape* contains interlocking shapes referring to a part of the anatomy that cannot usually be seen (Fig. 25). He professed to be influenced by the ability of scientific study to break things down into smaller parts.[82]

Using the versatile organic form of ceramics, Thomas Stell could have been referencing these ideas of minute microscopic forms in his plaque designs. Composed of seemingly amorphous shapes that squiggle and intertwine, and enhanced with color and texture, the bas-relief compositions could have many inspirations. Another possibility is the imagery of the early printed circuit boards being developed by Texas Instruments and other electronics companies between 1948 and 1951. Processes of fabricating the first circuit boards were very much like that of any hand craft. Using “pliers, cutters, coils of raw materials such as wire, and bins of components,”[83] electrical engineers and other informed employees hand-assembled these three dimensional objects from “lumpy tubes, beaded components, and snaky wires to be

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[80] Rapaport, 97. See also Mildred Friedman, “From *Futurama* to *Motorama”* in the same volume, *Vital Forms: American Art and Design in the Atomic Age 1940-1960* (New York: Brooklyn Museum of Art in Association with Harry N. Abrams, Incl., Publishers, 2001) 201.
[81] Rapaport, 104.
[82] Ibid., 100-102.
[83] Prelinger, 106.

mounted on a wall of a much larger device."[84] Four major techniques for the automatic fabrication of circuit boards were developed by 1951: printing, spraying, stamping and etching. Sometimes conductive metal would be painted on a base board. The visual image of these circuits inspired commercial artists as they produced ads for electronic companies. Raul Mina Mora, completed an oil painting in 1958 of a printed circuit board for a Budd Company advertisement (Fig. 26). They were a maker of laminates for electronics.[85] Within the design are many squiggles and organic shapes intertwined with geometrics, very much like Stell's compositions for the TI ceramic plaques.

Plastic laminates were used increasingly for substrate boards. "Circuit plans were hand-drawn, then reduced for printing before being mechanically stamped into the plastic base board."[86] In an advertisement for Rubylith by Ulano for *Electronics* magazine, an actual segment of the red masking film was attached so that readers could touch and examine it (Fig. 27). Once again, the amorphous line direction echoes those in Stell's plaques.

Symbolic and Geometric Shapes

Comparisons between modern artworks and scientific discoveries were first investigated by György Kepes, a Hungarian-born artist and theorist. He emigrated to the United States in 1937 to study interrelationships of cell and crystal structures and geometrics used in the fine arts.[87] During the 1940s, many artists were exploring images based on crystallography, or the "science of studying the internal atomic structure of matter."[88] Both fine artists and commercial

[84] Ibid., 104.
[85] Ibid., 104.
[86] Ibid., 107.
[87] Ibid., 20.
[88] Ibid., 76-77.

artists adopted actual shapes and symbolic lines and shapes to “describe and explain new technologies to their audience.”[89] The nature of electron transmission through pressurized crystals and synthetic substances is invisible to the human eye, so scientists and graphic artists developed a language of symbols to communicate ideas. Geometric simplicity of shape increased ease of readability. Straight lines, circles, triangles and loops were combined as visual diagrams of electrical components. Shorthand for parts such as capacitors, resistors, transistors, and “ground” were seen in magazine graphics. A 1959 recruitment advertisement for Melpar, a Cold War military-contract electronics firm, includes twelve of the circuit symbols arranged around a clock (Fig. 28). “The symbol for a cathode-ray tube is at the eleven o’clock position, while the transistor symbol is at six o’clock.” In between them are other common graphic symbols used at the time.[90] As was mentioned above, magazine advertising was paramount as a form of communication among the electronics industry.[91] All of this imagery was available to Stell as he made design and composition decisions for the TI ceramic artwork.

Stell’s Consolidation of Imagery

When compared to this historical background and the Haggerty drawings, the mysterious shapes of the finished artworks come across more clearly. Easily recognizable are products of Texas Instruments or engineering symbols, cylinders, coils, tubes and other components of equipment used within laboratories and manufacturing areas. Although the subject matter is simplified and sometimes out of proportion, the compositions provide human

[89] Ibid., 22.
[90] Ibid., 92-97. Quote on 96.
[91] Ibid., 22.

interest for employees because they have shapes and colors that relate to activities and objects of TI's business.[92]

Along with the machinery and nondescript lines and shapes depicted in the artworks, Stell included other features with amplified meanings. One example is the inclusion of three eyes on both the male and the female figures and the three arms on the woman (Figures 29 and 30). Although the third eyes could be interpreted as needed for microscopic vision and extended perception, Stell explained in an interview for the *Dallas Times Herald* in 1961 that the extra eyes were added because employees at Texas Instruments had to use their eyes so intensely in their work that they needed a third one.[93] His inspiration can be seen in photographs that show examples of TI female employees working closely with intricate components (Figures 31-33).[94] In many assembly plants during the 1950s, approximately half of the workers were women. According to *Fortune* magazine in 1957, this was "not because wage rates [were] cheaper but because women's skills in maneuvering impossibly small assemblies [were] higher than men's." This article also mentions that "J.E. [Erik] Jonsson, head of Dallas' Texas Instruments, in taking a visitor through his plant, pointed to the long lines of women looking through high-powered scopes as they assembled the tiny parts of transistors."[95] Even before the Semiconductor Building was built, female employees put together electronic

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[92] Visual information deduced by examining Stell's artwork and also drawings and photos provided by Holomshek.

[93] Andy Hanson, "Face of a Factory: Eyes have it in Dallas plant mural," *Dallas Times Herald Magazine,* July 23, 1961, 4. Copy retrieved from the Dallas Museum of Art Library. Eyes in other graphic art produced for the electronics industry are discussed by Prelinger, especially on 114.

[94] Texas Instruments file, Box 92-82 RG19 Photographs: SC Bldg. product lines, other unidentified co. 1960s, DeGolyer Library, Southern Methodist University. Captions over corporation owned photographs provide information. Also, see journals of O'Neil Ford, 1958. See also, Bosse 2014.

[95] Harris, "The Electronic Business," *Fortune,* April 1957, 143.

products, as can be seen in Figure 33, a photo from the shop at the Lemmon Ave. in Dallas around 1948.[96]

When Haggerty provided his drawings to Stell, he included notes with dimension measurements, color and materials labels, and technological wording concerning the machines, switches, laboratory set-ups, and products he illustrated. Specific language such as amber liquid, blue-gray, red-brown, khaki, and other phrases are scattered throughout the sketches. One such note reads: "these are really black but make them white." Haggerty marked not only specific colors but also the names of shapes, such as "hex," standing for hexagonal, and specific materials such as brass and aluminum. Terms such as "matrix grid," "sine wave," and "hex round" are included.[97]

Stell took many of these specific elements directly from the drawings as he formed his art from clay. In the finished artworks by Stell, representations of these engineering symbols would be recognizable and, therefore, meaningful to most Texas Instruments employees. A list of "descriptions" assigned to the original drawings illuminates their meaning. Such titles as "Large vacuum used in Diffusion operations," "Laboratory set-up," and "small bake ovens" connect the sketchy drawings to daily operations of the company.[98]

Stell's Art in the TI SC Building

The building's plan reveals an atrium and four courtyards that are placed within a long rectangle with a lobby set perpendicular to the main length (Fig. 34).[99] The arrangement of

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[96] Pirtle, 32.
[97] Ibid.
[98] "Descriptions of Sketches for Murals," from files of TI Real estate Offices, provided by Holomshek.
[99] This image is shown on a plaque on a wall in the building. The original floorplan was included in the *Texins* issue dedicated to the opening of the Semiconductor Building, Texas Instruments file, Box 92-82 RG19 Photographs: SC Bldg. product lines, other unidentified co. 1960s, DeGolyer Library, Southern Methodist University. During the

Stell's plaques within the courtyards shows a progression from the abstract designs to more literal subject matter, such as human figures and machines. Two courtyards have similar plaques with simple lines, shapes and symbols; the furthest space has a grouping of more complex compositions. Availability of space affords arrangements of two or three or five on separate walls.

The first grouping of Stell's plaques includes subject matter that does not refer to anything typically visible to the human eye or the objects of Haggerty's drawings, but resemble electronic symbols and microscopic organisms and chemicals. One is placed separately and three are on a narrow wall together at the south end of the space (Figures 8 and 3). All of them include the color combinations suggested by Haggerty in the drawings presented to Stell at the time of commission: dull blue, pale yellow and rust, soft green. The top plaque is a small triangle with rounded corners and three snake-like forms that link together and join at the center. Lower than this one and to its left is a larger oblong shape, again with rounded corners (Fig. 35). Approximately three feet in height, it features another set of raised lines, this time looping over each other and ending with double knobs. In between the resulting circular spaces, Stell set small bowl-like forms with diamond shapes inside. On the outer edges, more combinations suggesting organisms with eyes and fins complement the inner design. As in many of the thirteen plaques, the backgrounds on these have a texture similar to pebbles. The third, lowest and largest artwork in this grouping is a square but with the top corners rounded off (Fig. 4). Within this format, or size and shape of the artwork, can be seen two overlapping matrix grids, a sine wave made with the signature decorated line, and several of the biomorphic

renovation of 2011-2012, this new lobby was added to the west side of the structure. The original entry at the North end is still available to employees.

shapes, some seeming to drip or reach with claws. One of them includes six diamond shapes with circular central motifs. Stell consistently uses references to nature, to science, and to technology in this body of work. On the east wall of this space, another oblong rounded shape, again approximately three feet in height, contains a never-ending looping line of rust color accented by a central line of repeated diamonds (Fig. 8). The direction of the loops is toward the outside. In the empty spaces, Stell added more organic shapes of dull blue, pale yellow and rust.

The third courtyard includes four art pieces. The east wall holds another large oblong with a line looping toward the center and with the typical freeform shapes filling the remainder of the composition (Fig. 5). Two smaller rounded triangles, grouped on a narrow southern wall, display a different combination of the snake-like line used by Stell (Fig. 6). The other plaque in this light-filled space is set apart on the west wall and is comprised of yet more organic shapes with the familiar color scheme, a sine wave with an intersecting horizontal line, and a zigzag line placed horizontally (Fig. 7).

On the northern wall of the fourth garden court, there is a grouping of five of Stell's ceramic artworks, as can be seen in Figure 2. At top left is a plaque with images that correspond very closely to Haggerty's drawings with labels such as "Large vacuum used in diffusion operations," "Laboratory setup," "Tab sheet furnace," and "Portion of CAT machine."[100] CAT stood for Centralized Automatic Tester, a machine for testing transistors (Figures 36 & 31).[101] Slightly abstracted and compressed to fit into the basically rectangular format, the objects are

[100] See list of Haggerty drawings from Texas Instruments files, provided by Lisa Holomshek, drawings 1, 3, 19, and 18, respectively.
[101] Pirtle, 78.

nevertheless recognizable. To its right is the plaque with a male figure, set within a vertically aligned rectangle with an added triangular section pointing up (Fig. 29). Solidly built, the body of the man is clad in a cabled sweater complete with the Texas Instruments logo. His trousers have a herringbone pattern, and his untied shoelaces end in elliptical motifs. He is perched above a contraption that could have been adapted from Haggerty's drawing called "Dry box on Thermal-bonding machine," but with extra wires and a hose.[102] In front of the man in the artwork are several squares filled with components reminiscent of early electrical boards, such as can be seen in a photo of women assembling product in the 1940s (Fig. 33). Above the male figure in the plaque, two "Calibrated pressure indicator[s]" float over a "Diffusion pump (vacuum)" and the geometrical boxes.[103] Perhaps this man is an inventor, an engineer, a scientist, or all of these in one, in need of the extra eye due to the complexity of his work.

In the center of this grouping of artistic plaques is a circular piece approximately two and a half feet in diameter (Fig. 37). Similar to the composition of the famous Aztec calendar, this artwork has concentric rings of repeated motifs that bring to mind electrical wiring, buttons, knobs, and gears. Unfortunately some of the original decoration on this piece has fallen off and been lost.[104]

As a complement to the male employee represented on the top right, a female figure dominates the plaque on the lower left (Fig. 30). Also clothed in a cable sweater, she pairs it with patterns on her skirt, stockings and shoes. She wears a bracelet and rings on every finger of two of her hands. A third arm extends from beneath her, helping her with the tasks before

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[102] Haggerty drawings, drawing 7. A photo of a dry box can be seen in Figure 10.
[103] Ibid., drawings 9 and 15, respectively. Early electrical boards appear in the 1940s photo from Lemmon Ave., Figure 33.
[104] Haubrich interview.

her. Included in the surrounding designs are, once again, several references to Haggerty's drawings. At the top is a duplication of his sketch called "Bomb hood used on production line;" to its right and below the woman's arm are "Scales."[105] A microscope and a vase of flowers are added to the area at the right and then "Scales for determining quantities of small parts" can be seen. Below that is a "Small bake oven."[106] At the lower left is a typewriter, and at top left is a "Table lamp bracket" and lamp – an expansion of Haggerty's drawing number 14.[107] In any extra available space are squiggles, blobs, and other shapes that could be tools or organic elements or any other manner of extra equipment. Again, Stell has blended human, natural, and technological elements.

The last plaque in this group is the interpretation of Haggerty's drawing of a "Rotary etch machine," also labeled "Electromechanical Design." (Fig. 38) Slightly shifted to fit the diamond shape, it is almost an exact replica even so far as color choices and metallic finishes that were specified by the TI executive (Fig. 21).[108]

The placement of the pieces did not create a smooth narrative so much as it provided episodes of TI's world, as if capturing moments in time. The art was intended to be an extension of the modern structure, similar in material to the brick walls, and similar in angularity to the hyperbolic paraboloid roof and second floor space frame.

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[105] Haggerty drawings 13 and 17.
[106] Ibid., drawings 4 and 5.
[107] Ibid., drawing 14.
[108] Ibid., drawing 20.

Trends in Contemporary Corporate Art and Architecture

The unique art of Thomas Stell added to the complex environment of the Semiconductor building. Its rich beauty and symbolism, joined with Ford's architecture, situated TI within the national field. The growing Texas company was now participating in a larger trend of suburban corporate campus structures.

Corporations in the United States had been using artistic advertising and adorning their buildings with symbolic sculpture for decades. Another trend embraced by large corporations of the era was a meshing of exterior and interior space.[109] Within TI's expansive Semiconductor building, the manifestation of this idea was the incorporation of the courtyards. These and other choices were prevalent when Ford and Stell designed the architecture and art of the TI Semiconductor building.

There were societal reasons behind the shifts taking place. In the late nineteenth and early twentieth centuries, U.S. corporations saw tremendous growth – growth that caused changes in philosophical ideas concerning their functions. Companies such as General Electric and American Telephone and Telegraph (AT&T) realized the necessity of research along with development and manufacturing. Specialized spaces were needed for the physical operations of laboratories and to provide for the personnel housed in those spaces as they continued their mental activity. During the 1930s and 40s, many businesses made plans to move to rural

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[109] For examples of this trend, see Scott G. Knowles and Stuart W. Leslie, "Industrial Versailles: Eero Saarinen's Corporate Campuses for GM, IBM, and AT&T," *Isis*, Vol. 92, No. 1 (Mar., 2001), The University of Chicago Press on behalf of The History of Science Society, accessed January 20, 2015, http://www.jstor.org/stable/237325. Bell's use of campus-like acreage, 22-24; General Motors Technical Center's rectangular lake, a focal point within the complex, 9; IBM's interior glass walled walkway, 14-17. Also, see Dillon for Ford and Colley's placement of a small, planted courtyard at the entrance to the Houston Technical Laboratories facility, 79. A broader view of this trend is described in Mozingo.

settings to provide an environment conducive to scientific thought.[110] To present an image of higher culture than what had formerly been associated with factory communities, they chose the aesthetics available through architectural design and fine art. Just a few specific trends embraced by large corporations in architectural settings were 1) outside views to provide green space and lighting for employees, 2) removing research and development housing from urban centers, and 3) including sculpture and other artwork on their corporate campuses.[111]

In 1941, American Telephone & Telegraph built a complex to house their Bell Laboratories near Summit, New Jersey. Other corporations who subsequently decided to build in the suburbs, and also coordinated ideas and products, were General Electric, General Motors (GM), IBM, and Texas Instruments.[112] Corporation management hired experts to improve and promote their public image in keeping with the times.

GM "Styling head Harley Earl convinced his boss, Alfred Sloan, to build a new suburban center to house [their] corporation's styling, research, and engineering staffs." It was the goal of these men to connect the design of the buildings to the sleek, modern designs being developed for automobiles (Fig. 39).[113] The president of GM said, "we believe that such surroundings stimulate creative thinking and are conducive to good work" and that these

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[110] For a discussion about plans for building projects for Bell Laboratories, IBM and GM, see Knowles and Leslie.
[111] In her text, Mozingo presents the philosophies and policies of early U.S. corporations. Also, see Alice T. Friedman, *American Glamour and the Evolution of Modern Architecture (*New Haven and London: Yale University Press, 2010).
[112] Mozingo, 26-27.
[113] For comprehensive discussion about this era and the correlations between design for autos and architecture, see David Hartman, *From Autos to Architecture: Fordism and Architectural Aesthetics in the Twentieth Century* (New York: Princeton Architectural Press, 2009). Quote from 210. For more discussion about this era, see Alice Friedman.

decisions would all work together to "speed the processes whereby many more new developments may be brought into being for the good of all."[114]

The new GM Technical Center was designed by star architect Eero Saarinen in order to secure their reputation as a glamorous company with sleek and sophisticated products.[115] Alice Friedman, in her illuminating text *American Glamour,* describes a phenomenon that transpired in postwar American society and affected not only fashion and art but also architecture. After the difficult years of the Depression and then World War II, economy boomed. Consumers, whether in the form of individuals or companies, had the opportunity to make choices that had not been possible for decades. Designs were glamorous, symbolizing power, speed, and modern technology. All things newly fashionable were popular.[116]

The corporate complex Eero Saarinen designed for General Motors expressed commitments to the utilization of innovative technologies and original, artistic statement that reflected the needs and philosophies of his clients.[117] In and around the Center was evidence of Saarinen's arts and crafts background. The employees' restaurant showcased a gilded bronze screen by Harry Bertoia (Fig. 40). A 20-foot commissioned sculpture by Antoine Pevsner, *Bird in Flight,* was placed in between the Administration Building and the Styling Dome. (Fig. 41) Additionally, an industrially influenced painting by Charles Sheeler and various murals and

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[114] Mozingo, 81.
[115] Ibid., Chapter 3. Alice Friedman discusses the rise of General Motors and its image promotion policies.
[116] See Friedman's "Introduction" in *American Glamour,* 1-36.
[117] Alice Friedman, 112. Nancy Miller, "Eero Saarinen on the Frontier of the Future: Building Corporate Image in the American Suburban Landscape, 1939-1961," PhD diss., University of Pennsylvnia, 1999, 42, 44, 47-48, 118-19, 124. Knowles and Leslie, 7.

sculptures could be seen throughout the complex. These artworks reiterated GM's image of modernity, much like the designs of their swift automobiles.[118]

Another corporation leader who understood the importance of image promoted through design was Thomas Watson Jr., President of IBM. Working with Paul Rand, a design consultant, and Eliot Noyes, an industrial designer and architect, he exacted a change in the look of IBM, "from stationery and curtains, to products such as typewriters and computers, to laboratory and administration buildings."[119] IBM became well known in the 1950s through their modern electronic products and promotional packaging as well as their architectural design (Fig. 42).[120] Working with Watson, the two designers reinvented IBM's visual image.[121] Watson wanted his new facilities in Rochester, Minnesota, and Yorktown Heights, New York, to have style along with functionality. He and Noyes thought alike about the importance of design as a communication path within and outside the company and felt that "the look of IBM was essential to the way it functioned."[122] These ideas further came to fruition when Watson followed Noyes' recommendation and hired Eero Saarinen. Under his guiding hand, the job of designing expanding facilities began, another step in Watson's plans of using architecture and other forms of visuals to promote IBM's products.[123]

Corporate leaders in Texas also recognized the value of art as a tool for promoting a public image. Peter and Waldo Stewart, brothers who operated a Dallas farm machinery

[118] Alice Friedman, 123-124. Nancy Miller, 114.
[119] John Harwood, *The Interface*: *IBM and the Transformation of Corporate Design 1945-1976* (Minneapolis London: University of Minnesota Press, 2011), 47.
[120] Knowles and Leslie, 13. Also see Harwood for a complete history of IBM's promotional transformation.
[121] Harwood, 47.
[122] Ibid.
[123] Knowles and Leslie, 13.

company, wanted an object to "enliven a simple building."[124] Their plan was to prominently display art, placed on the grounds of the new facility on North Central Expressway, in such a way as to be visible to passing traffic and, thereby, create a visual connection for the public.[125] The work of Miguel Covarrubias was familiar to the Stewart family due to their business connections in Mexico, so in the early 1950s, they asked him to create a glass mosaic mural (Fig. 43). Completed in 1954 for the Stewart Company, it is called *Genesis, the Gift of Life,* and portrays in vivid colors what Covarrubias believed to be a Native American concept of the four elements of the world – water, earth, fire, and air. Using symbols, Covarrubias included the elements on one large panel. There is no definite division from one component to the next. Instead, the symbols interact with one another fluidly.[126] The focal point of the work is a large red hand holding a sprouting acorn that recalls a treasure found by Peter Stewart and his son during a walk one day. It exemplified, in Stewart's words, "the perfect symbol of the gift of life – natural, indigenous, dramatic." Peter and his brother Waldo had asked the artist to include a representation of the "Divine Giver of Life." The hand and acorn not only complied with their request, it also provided a central, powerful motif, "binding the four elements together."[127] Since the Stewart Company was a manufacturer of farm equipment, the idea of creation involving the elements was essential to them.[128] The Stewart brothers sought out an image that would symbolize the activity resulting from their business, which was controlling the elements

[124] "*Genesis* by Miguel Covarrubias (dedicated – 1955)" retrieved from "Miguel Covarrubias" archival artist file, Mildred R. and Frederick M. Mayer Library, Dallas Museum of Art Archives.
[125] North Central Expressway is the same thoroughfare chosen by TI for their facilities.
[126] "Public Works of Art, Dallas Museum of Art: Miguel Covarrubias (1904-57)," *Dallas, Texas,* accessed September 15, 2015, https://www.bluffton.edu/~sullivanm/texas/dallas/dallasmuseumsc/sc2.html*,* 2. Originally commissioned by the Stewart Company, the mural was later donated and moved to the Dallas Museum of Art and now stands at its entrance. The paperwork for negotiations are archived in the Dallas Museum of Art Library.
[127] "*Genesis.*"
[128] Ibid.

to produce plant growth.[129] They were one more example of the growing trend of companies using art and architecture to develop public recognition.

The ceramic wall murals by Thomas Stell, Jr. served the same purpose. TI and these other giants of business endeavored to exemplify their goals and values. Haggerty requested that Stell produce images of Texas Instruments equipment representing scientific development within his company, knowing that the equipment was necessary to build the products and, subsequently, increase capital through sales of those products. The goals of Texas Instruments included corporate growth, impacting the electronic manufacturing industry with significant products, and establishing an identity within the industry. With a new name, new products, a new building, and meaningful art, Texas Instruments placed itself among the other industry leaders. This was clear in the instances of publicity and reception it received.

The new building possessed characteristics of note – qualities and traits about which people in both art and industry could read in their journals as well as newspapers. Employees of the corporation had been informed about the plans, construction and completion of the Semiconductor building through their newsletter, the *Texins*, and through a specially produced pamphlet.[130] The dedication ceremonies and ribbon cutting reaffirmed their expectations. Prominent scientists and representatives from the United States military attended and were

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[129] Ibid. Also see "Farm Equipment Testing and Sales Center in the Southwest," (no author listed), 1955 in *Buildings for Research,* No publication location given, published by the F. W. Dodge Corporation, 1958.

[130] See *Texins for the Employees of Texas Instruments Incorporated: New Plant Issue,* June 1958; also, Junetta Watson, Editor, "Pattern for Progress," *Texins for the Employees of Texas Instruments Incorporated*, Volume 4, Number 3 (April/1957) and Darleene White, Editor, *Texins for the Employees of Texas Instruments Incorporated*, Volume 5, Number 5 (May 1958). *New Plant Issue*, June/1958, Texas Instruments file, Box 92-82 RG19 Photographs: "SC Bldg. product lines, other unidentified co. 1960s," DeGolyer Library, Southern Methodist University.

witness to TI's progressive new surroundings.[131] *Architectural Forum* included quotes from Haggerty concerning the new structure in an article called "Good architecture is good promotion." The title itself spoke volumes. Specifically, mention of Texas Instruments reiterated their philosophy that buildings must serve aesthetic as well as practical purposes.[132] Dallas newspapers informed the general public that TI was adding to their facilities. Don Freeman wrote for the *Dallas Morning News* that the "factory [had a] new look." [133] *The Dallas Times Herald* ran a story with a full color reproduction of the ceramic plaques in their *Sunday Magazine* (Fig. 44).[134]

All of the personalities involved with the TI Semiconductor Building production would have had access to information about recently built corporate campuses through networking, government communication, business journals, and design publications.[135] These types of publicity resulted in increased local and national recognition and were a sign that TI was a corporate art patron within the context of current trends. O'Neil Ford's architecture and Thomas Stell's art were a large part of that established identity.

Conclusion

The TI Semiconductor Building, as a piece of O'Neil Ford's distinctively regional expression of modern architecture, is best known for its scientific and engineering advancements in the field of electronics. Along with Stell's plaques, it also represents TI's placement in corporate sponsorship of the arts in the postwar period. The regional flavor of

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[131] Pirtle, 98.
[132] Dillon, 79, 146. Also, "Good architecture is good promotion," *Architectural Forum,* Vol. 113, July, 1960, 88-89, 186-187.
[133] Don Freeman, "'New Look' Factory," *Dallas Morning News,* June 29, 1958.
[134] *The Dallas Times Herald Sunday Magazine,* ND, article photos retrieved from the Briscoe Center for American History vertical files: "Stell, Thomas M., Jr." (in Sid Richardson Building on UT campus in Austin).
[135] See discussion about information dissemination in Mozingo, 16.

Stell’s and Ford’s mixture of human and technological characteristics was different from other corporate complexes built during the 1940s and 1950s. These different aspects enlarge and complicate our notion of corporate sponsorship of those times. Texas Instruments leaned upon their art and architecture to define the company’s specific identity and work environment while also presenting itself as a growing enterprise. This was a clear goal since the inception of the building under the leadership of Haggerty.

The creation of ceramic wall hangings by Stell resulted in a composite of symbols projecting the scientific and economic successes of Texas Instruments in a form that contributes to the identity of a distinctive regional culture, while at the same time reinforcing the self-proclaimed identity of Texas Instruments as a corporate art patron within that culture. By its stylistic connections to Texas regional art and architectural trends and by using the subject matter of Texas Instruments manufacturing equipment, Stell's personal interpretation was meant to portray and promote a modern business with roots in Texas, conjoining this corporation with other progressive business art patrons.

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Figure 3. Thomas Stell, Jr., Ceramic wall hangings. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

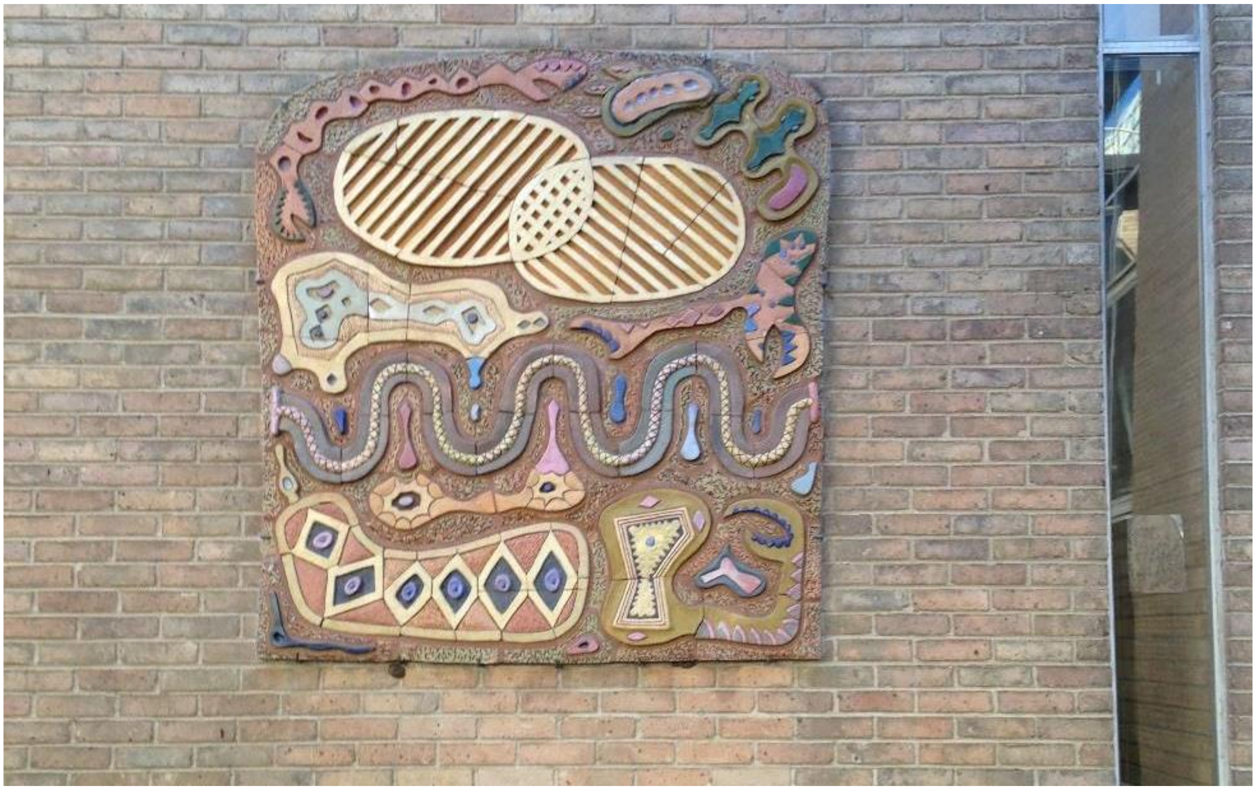

Figure 4. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

Figure 5. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

Figure 6. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author’s photo.

Figure 7. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

Figure 8. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

Figure 9. “TI’s silicon reactors supplied the ultra-pure material for the crystal pullers. Silicon crystals were then sliced into thin wafers for use in transistor manufacturing.” Pirtle, 70.

Figure 10. Texas Instruments employee. “Helen Bryant peers through a binocular microscope inside a “dry box” in 1953.” Image retrieved from Pirtle, 61.

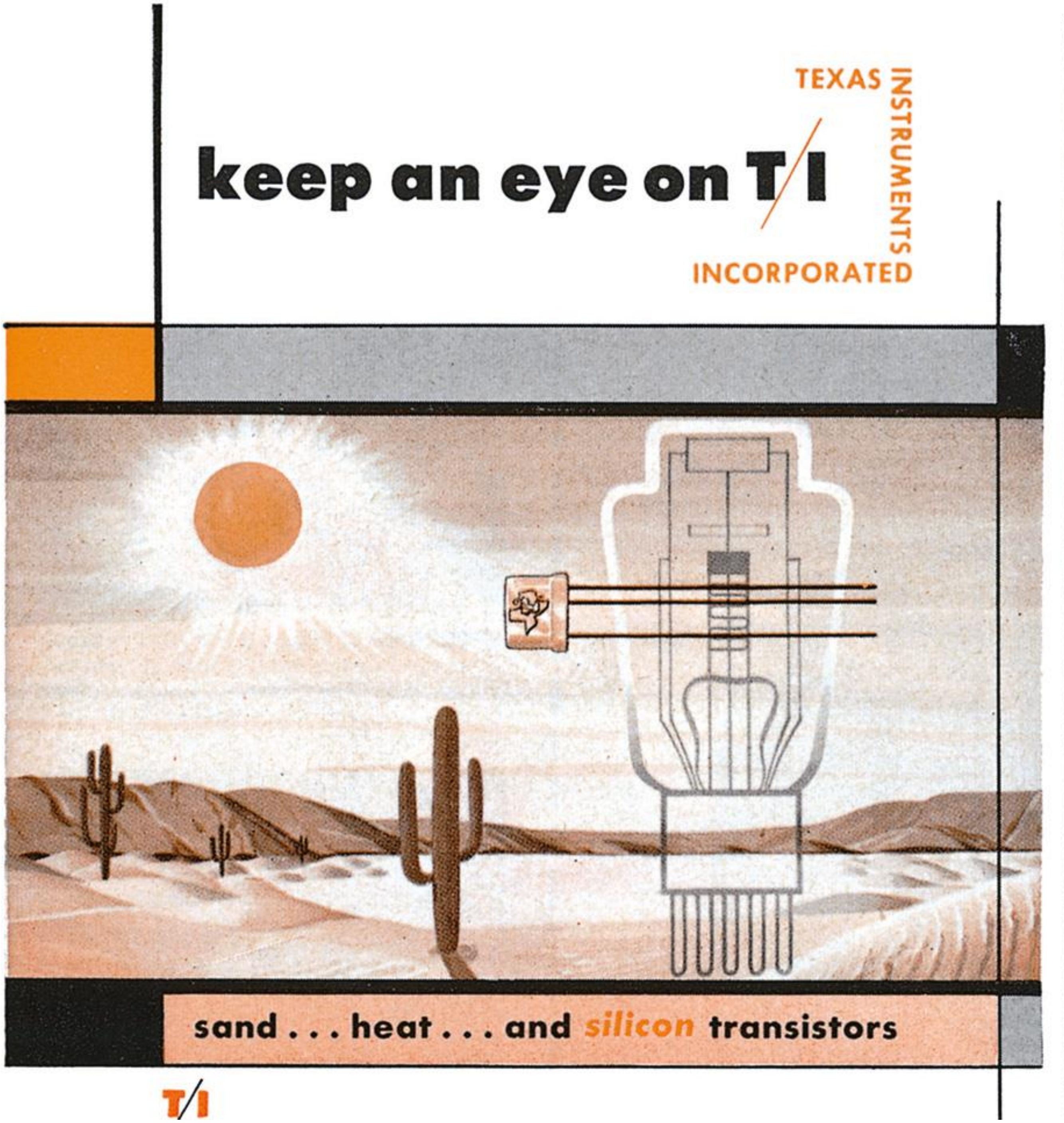

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Figure 12. Otis Dozier. *Cotton Boll*, 1936. Oil on Masonite. Dallas Museum of Art. https://uncrated.wordpress.com/tag/otis-dozier/.

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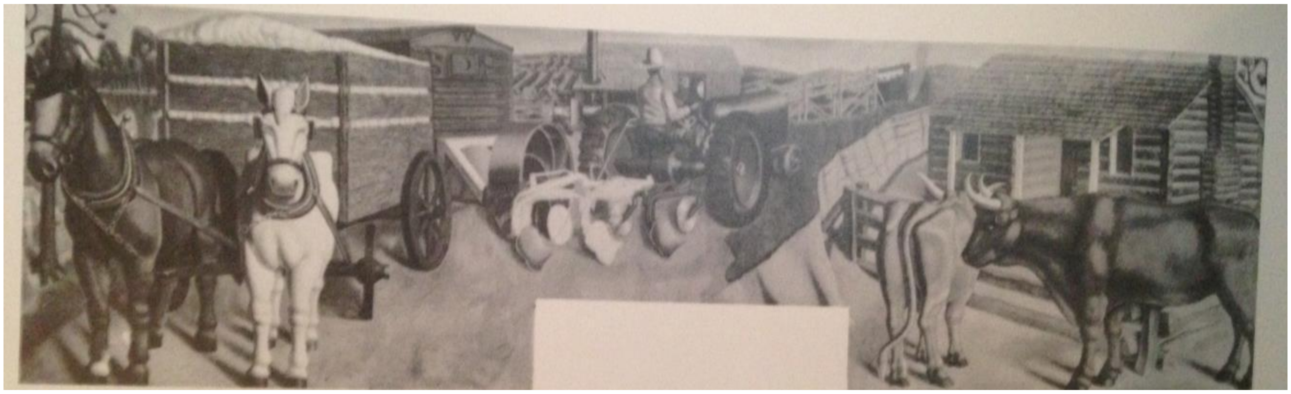

Figure 14. Thomas Matthew Stell, Jr. *Texas Farm Scene,* mural designed c. 1938 and installed in 1946 in the Post Office of Longview, Texas, under the auspices of the Section of Fine Arts, Public Buildings Administration. Image retrieved from Stewart, 124.

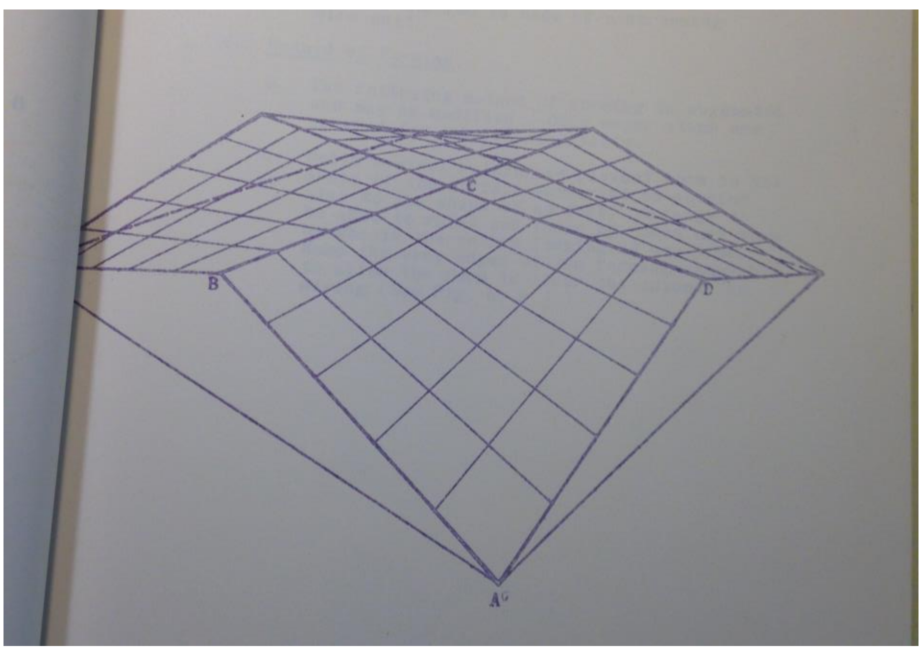

Figure 15. O'Neil Ford and Richard Colley, plans for Texas Instruments Semiconductor Building, 1957-58, Dallas. Diagram of four hyperbolic paraboloid units, "forming ridges at right angles with rakes." Image retrieved from Southern Methodist University Texas Instruments Archival files, DeGolyer Library, Box 91-10.

Figure 16. This image shows both the underside of the hyperbolic paraboloid roof and machinery that was used in the SC Building. The original caption reads: “Operators control the growth of silicon and germanium crystals, purer and larger than gems found in nature. TI operated the electronics industry’s largest battery of the intricate machines in its new Semiconductor Components plant around 1958.” Pirtle, 69.

Figure 17. O'Neil Ford and Richard Colley, Texas Instruments Semiconductor Building, second floor. Photo by Nan Coulter, retrieved from Charissa Terranova, "O'Neil Ford's 1950s Texas Instruments building is still a haven for high-tech," *FD Architecture Design,* October 15, 2014. Accessed December 29, 2015. http://www.fdluxe.com/2014/10/infinity-beyond-inside-texas-instruments.html/#prettyPhoto.

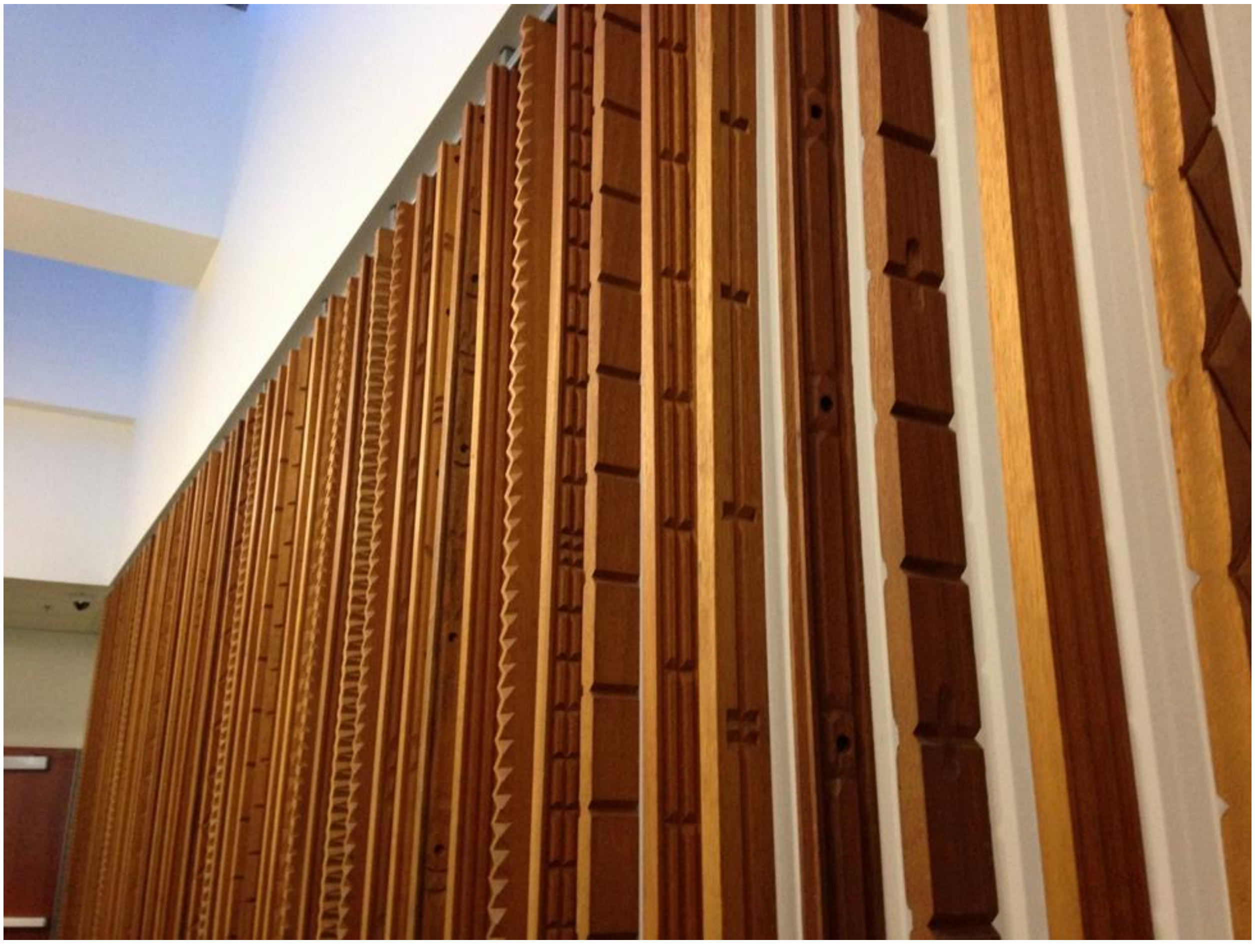

Figure 18. Lynn Ford. Carved wooden screen. 1958. Texas Instruments Semiconductor Building entry area. Dallas, Texas. Author's photo.

Figure 19. Martha Mood. Ceramic lighting fixtures. 1958. Texas Instruments Semiconductor Building. Dallas, Texas. Author's photo.

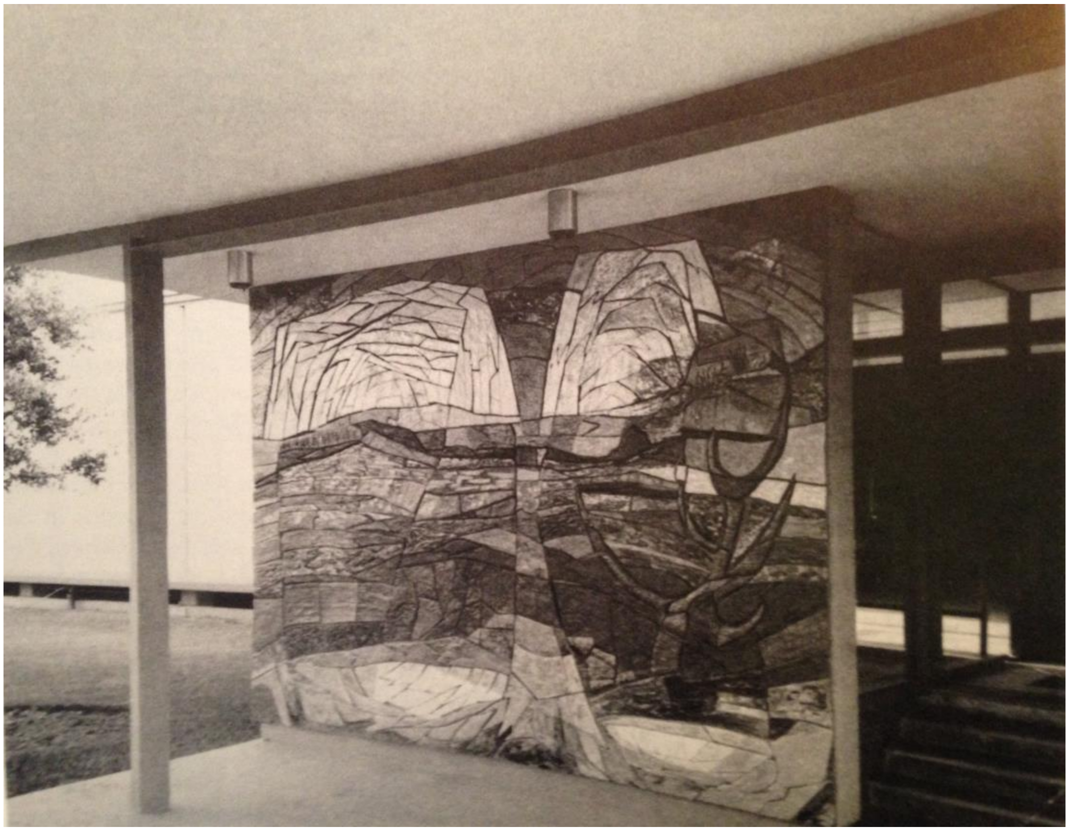

Figure 20. Cecil Casebier. Mosaic mural. 1954. Houston Technical Laboratories building, Houston.
Image retrieved from George, 122.

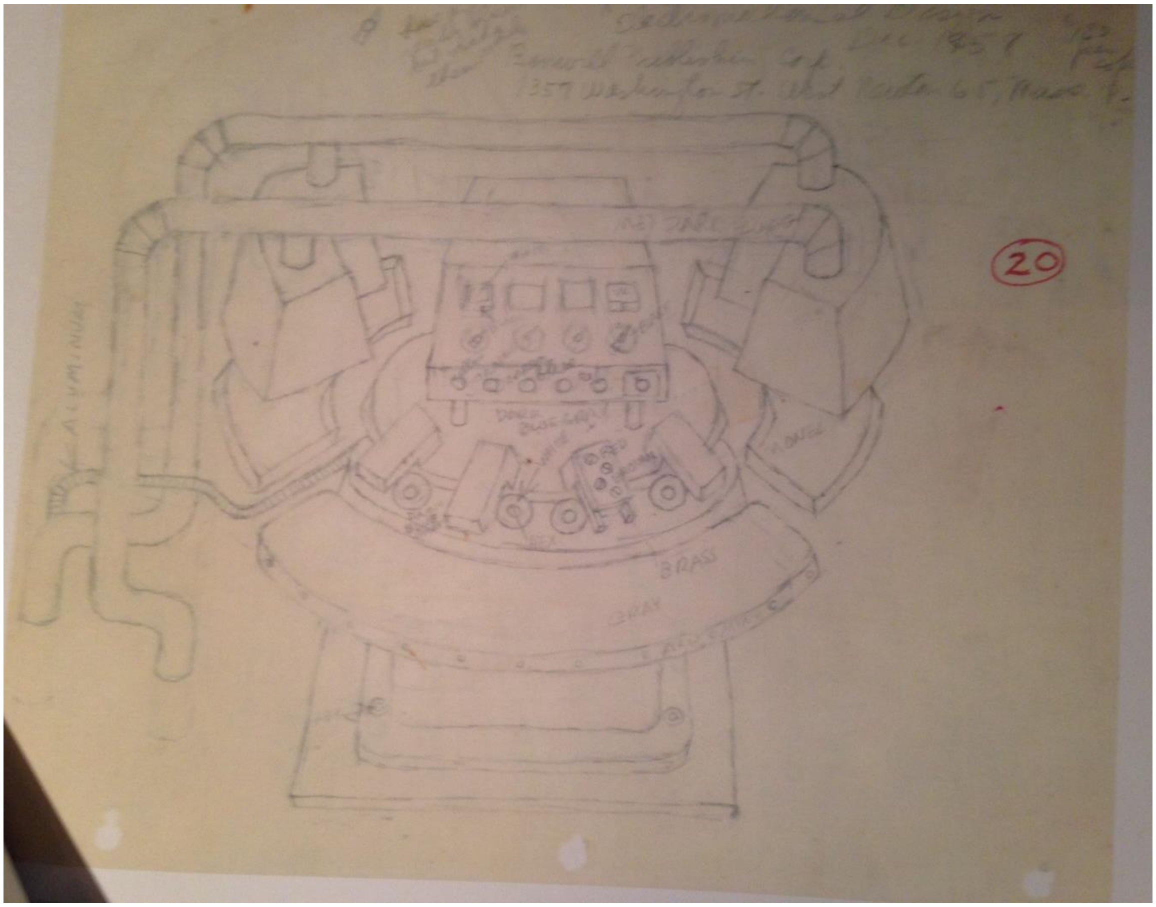

Figure 21. Patrick Haggerty. "Electromechanical Design." Drawing 20 of engineering sketches given to Tom Stell as material for subject matter. Image from Texas Instruments files, Real Estate office, provided by Lisa Holomshek, Project Manager, Texas Instruments, WW Facilities - Design, Sales & Real Estate, via email March 3, 2015.

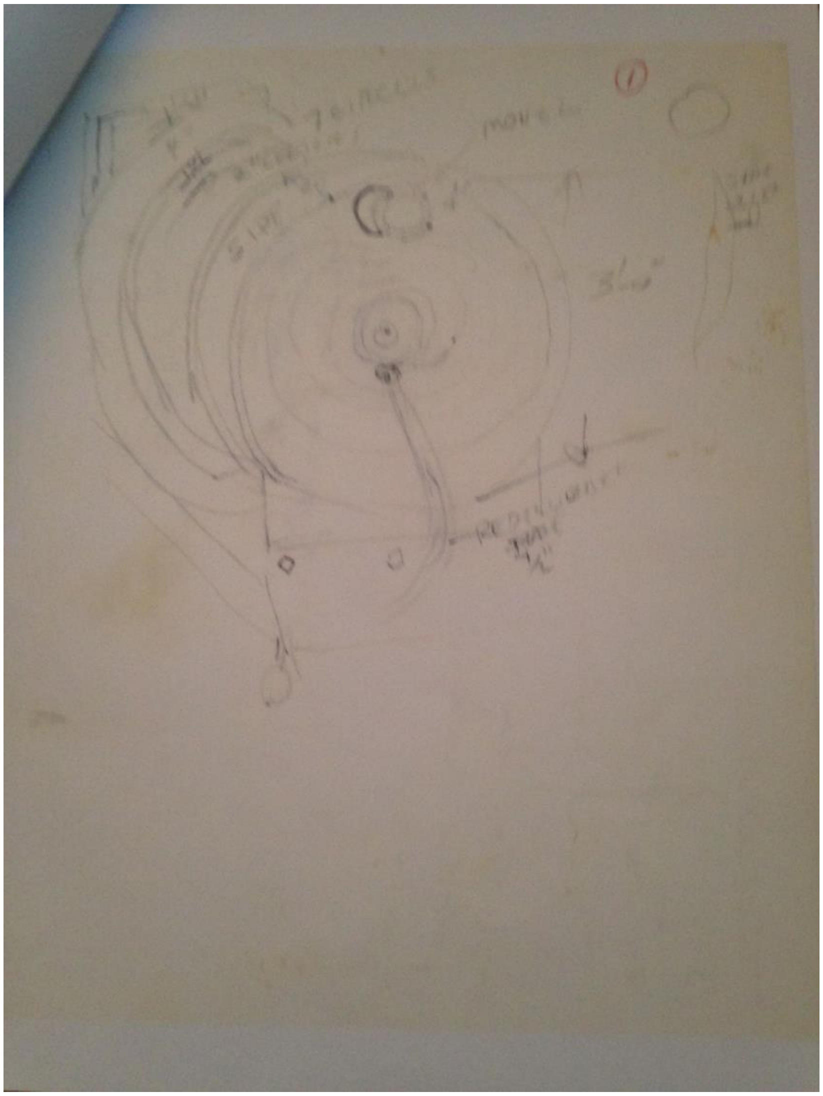

Figure 22. Patrick Haggerty. Drawing 1 of engineering sketches given to Tom Stell as material for subject matter. Image from Texas Instruments files, Real Estate office, provided by Lisa Holomshek, Project Manager, Texas Instruments, WW Facilities – Design, Sales & Real Estate, via email March 3, 2015.

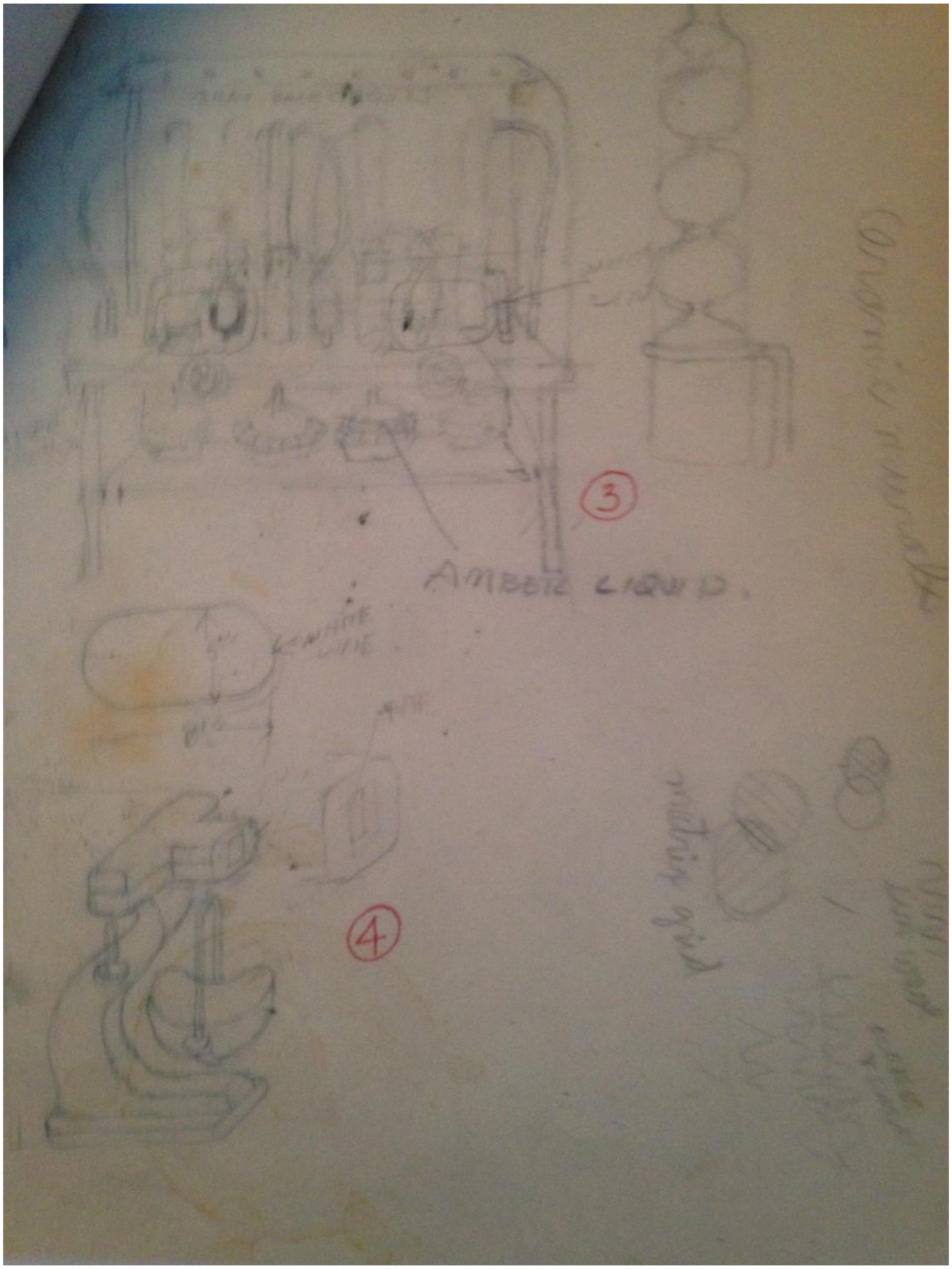

Figure 23. Patrick Haggerty. Drawings 3 and 4 of engineering sketches given to Tom Stell as material for subject matter. Image from Texas Instruments files, Real Estate office, provided by Lisa Holomshek, Project Manager, Texas Instruments, WW Facilities - Design, Sales & Real Estate, via email March 3, 2015.

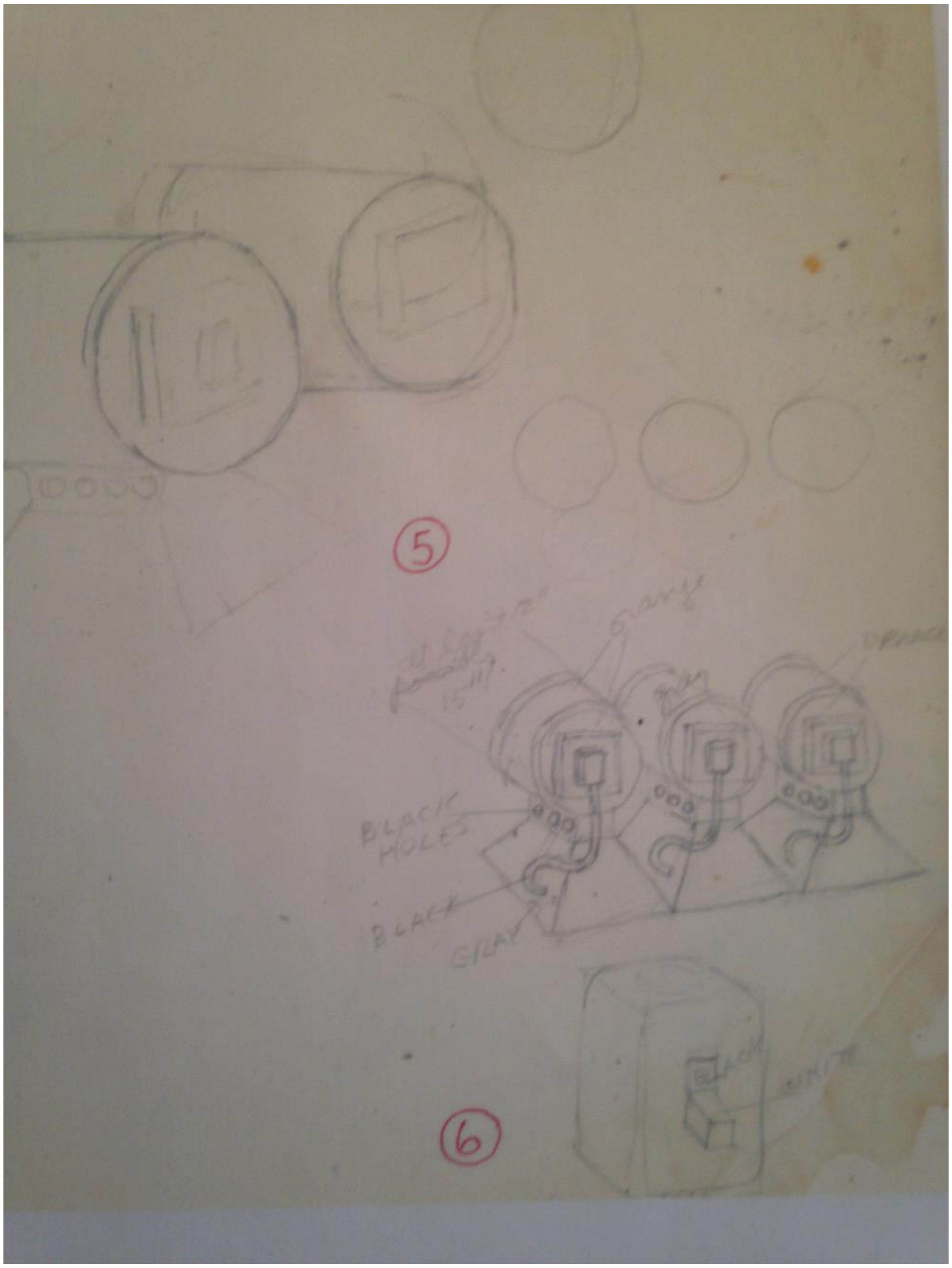

Figure 24. Patrick Haggerty. Drawings 5 and 6 of engineering sketches given to Tom Stell as material for subject matter. Image from Texas Instruments files, Real Estate office, provided by Lisa Holomshek, Project Manager, Texas Instruments, WW Facilities - Design, Sales & Real Estate, via email March 3, 2015.

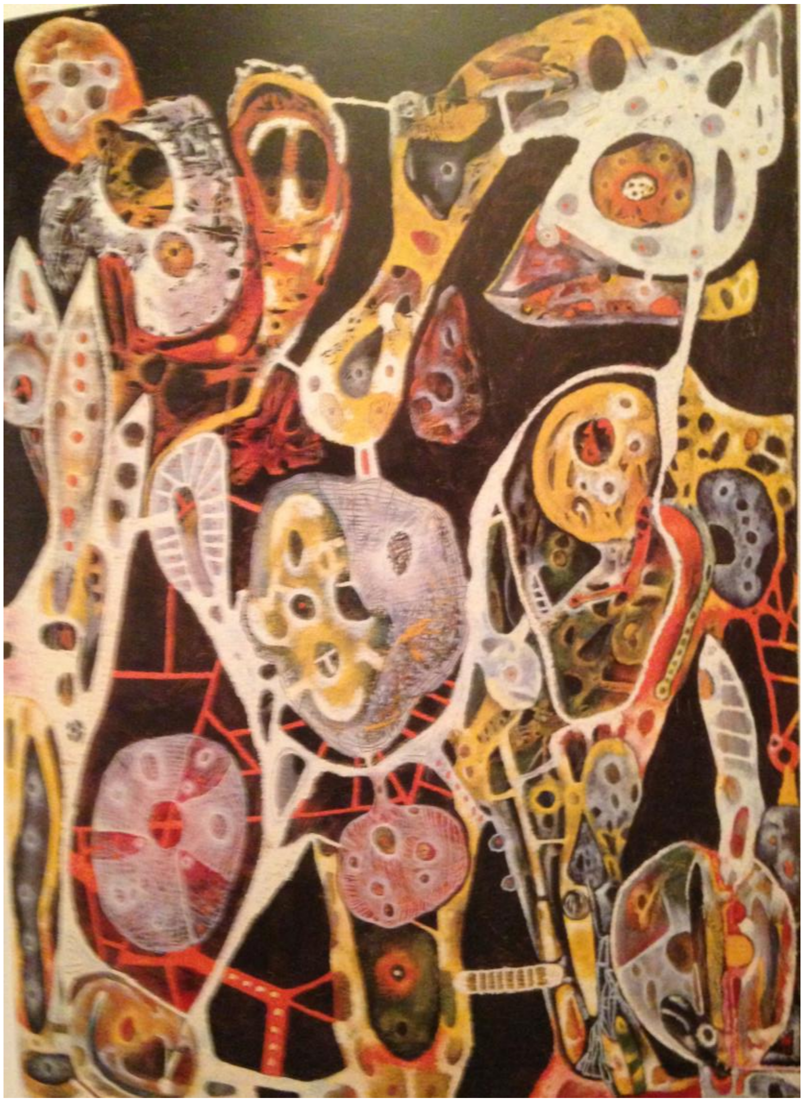

Figure 25. Charles Seliger. *Cerebral Landscape,* 1944. Oil on canvas, 24 x 18 inches. Wadsworth Atheneum Museum of Art, Hartford; Gift of Mr. and Mrs. Alexis Zalstem-Zalesskyy, 1956. Image retrieved from Rapaport, 103.

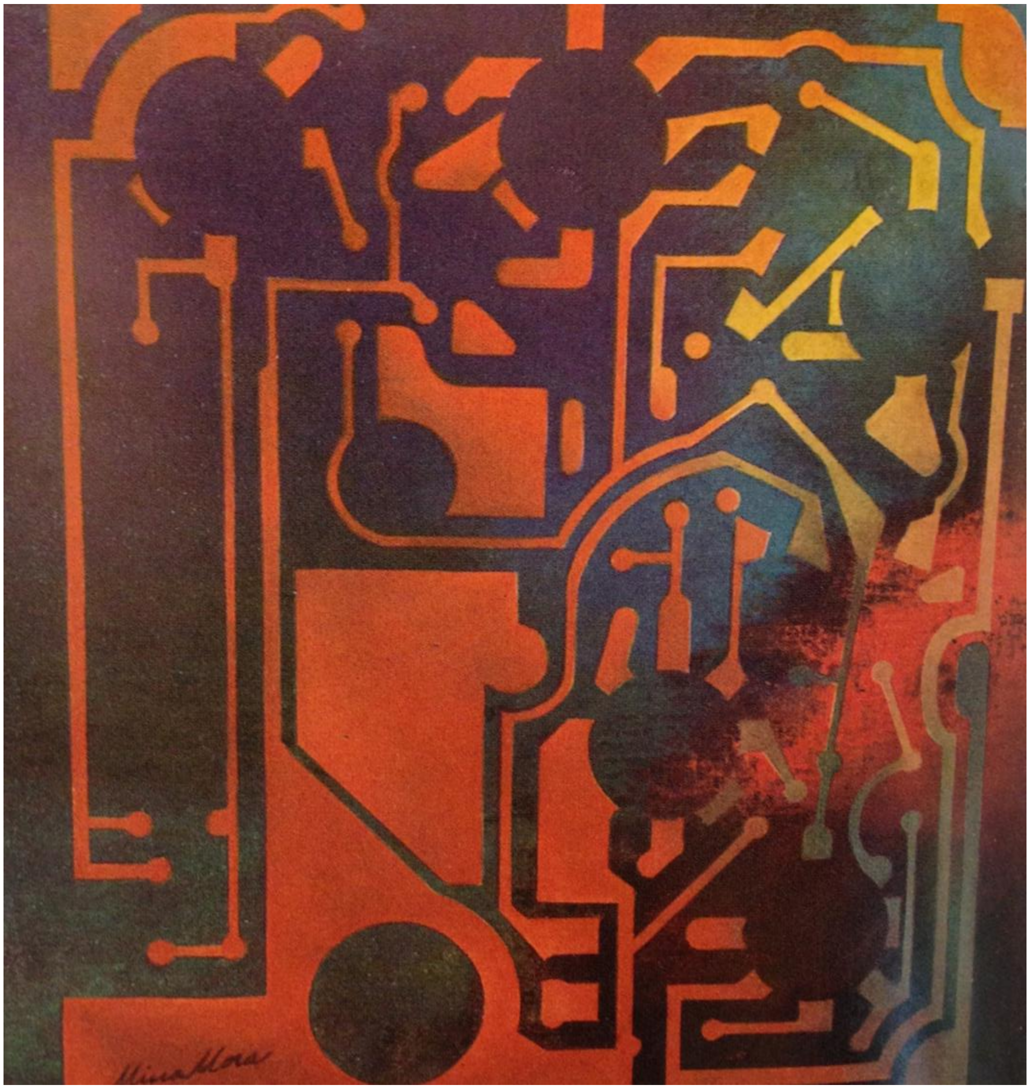

Figure 26. Raul Mina Mora. No title. Oil painting. 1958. Image of a printed circuit board produced for the Budd Company, the parent company of Continental Diamond Fibre. Image appeared in *Business Week* 1500 (May 31, 1958): 14, and again in Prelinger, 104.

Figure 27. Sample of circuit board masking material attached to an advertisement for Rubylith by Ulano in *Electronics* 39 (June 13, 1966): 22. Ad copy included these phrases: "Making masks for Electronic Components," "Hand-cut masking firm for the graphic arts," and "the knife-cut light-safe masking film laminated to a stable polyester base." Image re-appeared in Prelinger, 108.

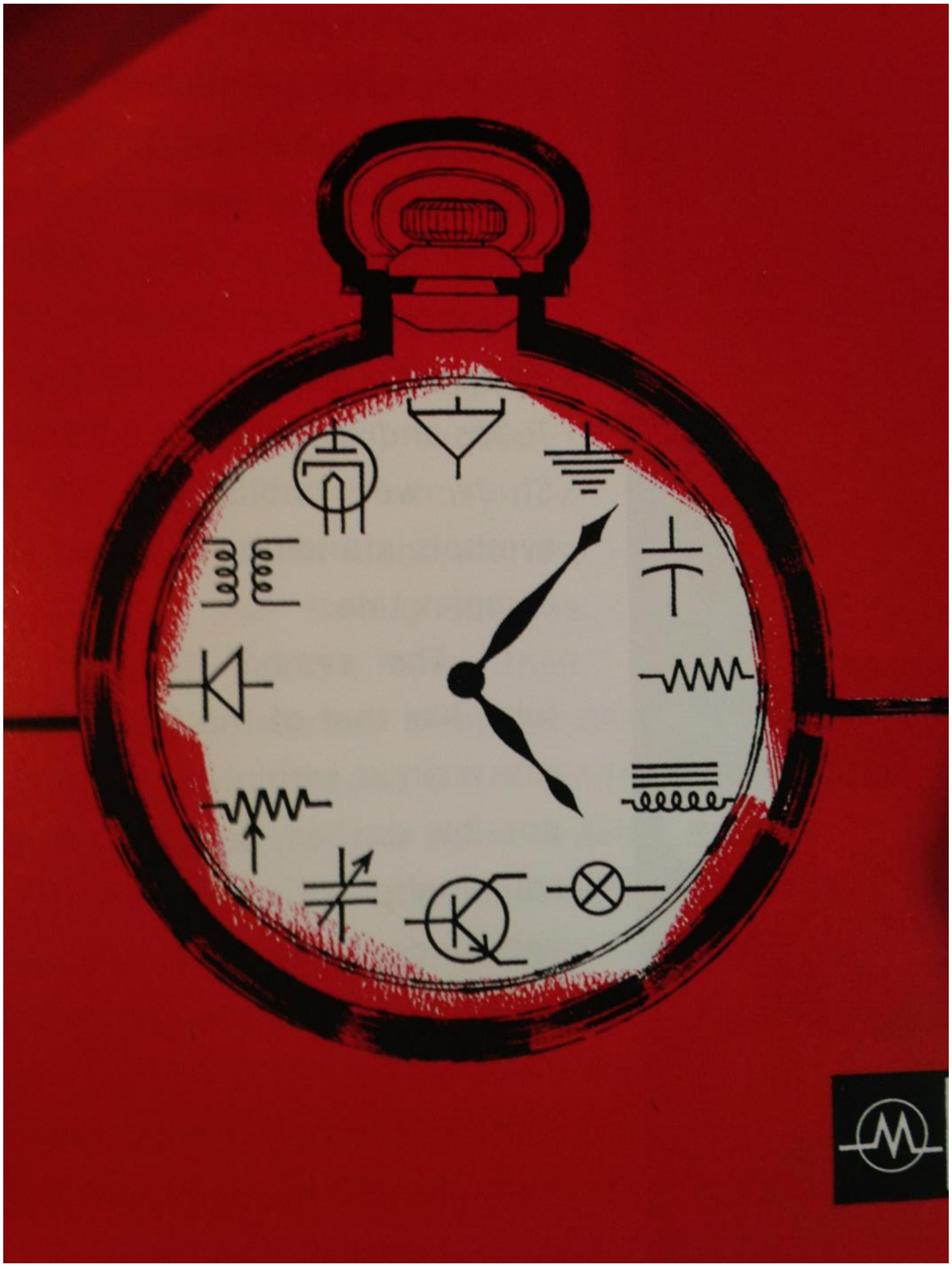

Figure 28. Unknown artist. Detail of a recruitment advertisement for Melpar Electronics. 1959. The catch phrase of the ad was “Electronic Creativity is a timeless quest.” Prelinger’s explanation reads: “Twelve of the circuit symbols most commonly used at the time are arranged in the position of the figures on a clock. The symbol for a cathode-ray tube is at the eleven o’clock position, while the transistor symbol is at six o’clock. In between them are the common graphic symbols for capacitance, resistance, ground, and the other major features of a mid-century electronics circuit.” Prelinger, 96. Image appeared in *Missiles and Rockets* 5 (June 1959): 27, and again in Prelinger, 97.

Figure 29. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

Figure 30. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

Figure 31. “Rows of Centralized Automatic Tester (CAT) machines testing transistors in the Semiconductor Building in 1960.” Pirtle 78.

Figure 32. A Texas Instruments worker demonstrates equipment to test transistors and diodes. [*Electronics,* 1964]. Image retreived from Prelinger, 87.

Figure 33. “Electronic production shop at Lemmon Ave. plant in Dallas around 1948. A growing base of military contracts, as well as new generations of geophysical equipment, kept the shop busy.” Pirtle, 32.

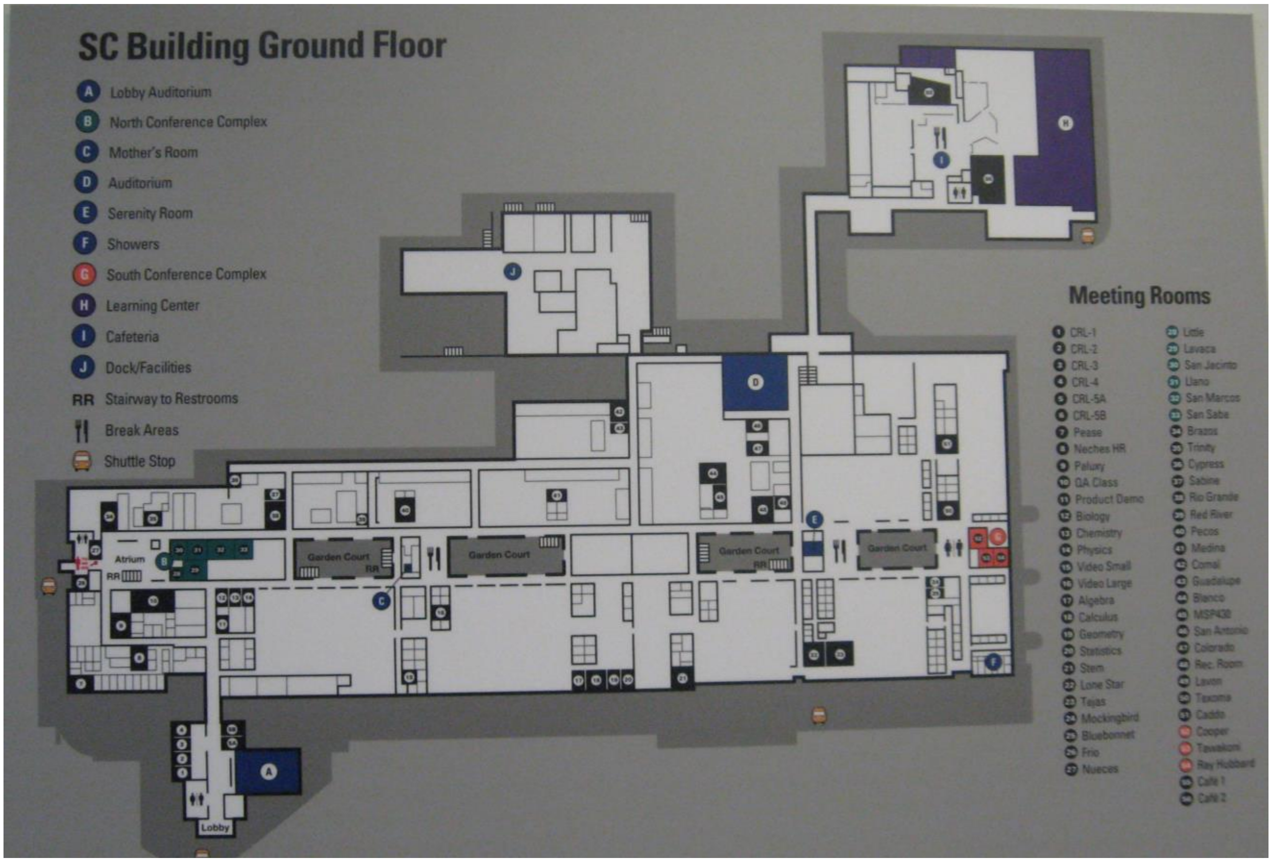

Figure 34. Floor plan of Texas Instruments Semiconductor Building shown on a plaque on a wall in the building. A similar plan was also included in the *Texins* issue dedicated to the opening of the Semiconductor Building, Texas Instruments file, Box 92-82 RG19 Photographs: SC Bldg. product lines, other unidentified co. 1960s, DeGolyer Library, Southern Methodist University.

Figure 35. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

Figure 36. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author’s photo.

Figure 37. Thomas Stell, Jr., Ceramic wall hanging. Texas Instruments Semiconductor Building, Dallas, Texas, 1958. Author's photo.

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Figure 39. Eero Saarinen, General Motors Technical Center, Michigan. Constructed in the 1950s. Image from “A visual History of Michigan’s Outsize Influence on American Modernish, Mark Byrnes,” *the Atlantic City Lab,* accessed April 2, 2016, @markbyrnes525, May 20, 2013, http://www.citylab.com/design/2013/05/visual-history-michigans-outsize-influence-american-modernism/5632/.

Figure 40. Eero Saarinen, GM Technical Center. View of screen by Harry Bertoia in the Employees Restaurant, Balthazar Korab Archive, Prints and Photographs Division, Library of Congress, Washington, D. C. [LC-DIG-krb-00130]. Image retrieved from Friedman, 124.

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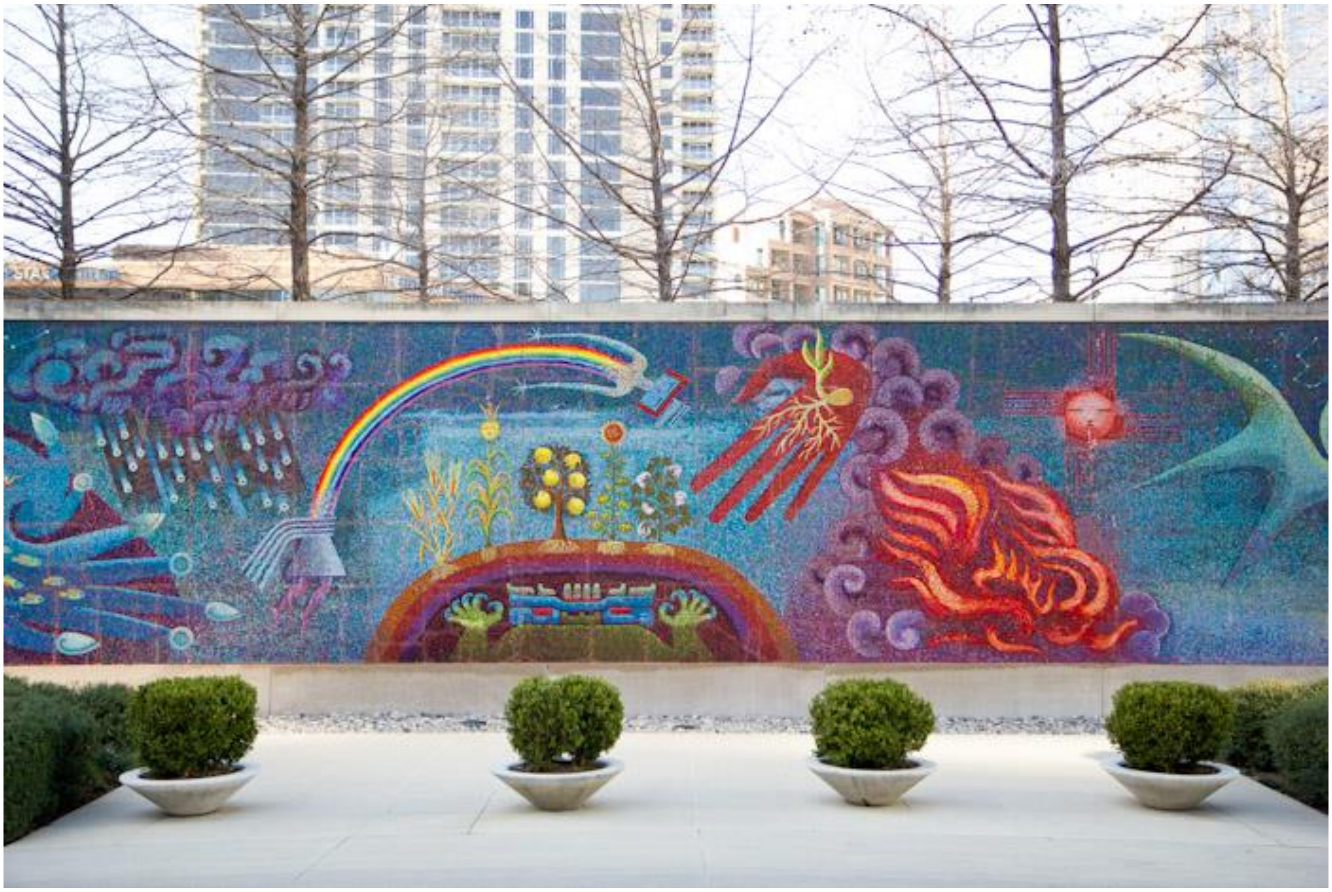

Figure 43. Miguel Covarrubias. *Genesis, The Gift of Life.* 1954. Dallas Museum of Art, Dallas, Texas. Image retrieved from "Art Feature: *Genesis, the Gift of Life," Earthbound Blog,* http://blog.earthboundtrading.com/blog/2013/04/19/art-feature-genesis,-the-gift-of-life/. Accessed January 28, 2016.

Figure 44. *The Dallas Times Herald Sunday Magazine,* ND, article photo retrieved from the Briscoe Center for American History vertical files: "Stell, Thomas M., Jr." (in Sid Richardson Building on UT campus in Austin).

Resources

Archival Files:

Briscoe Center for American History**,** Sid Richardson Building, University of Texas in Austin, American History vertical files: "Stell, Thomas M., Jr."

Dallas Museum of Art Library – Files: "Tom Stell," "O'Neil Ford," and "Miguel Covarrubias."

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Box 53, "Texas Art Texas Artists/Ford, O'Neil."

File: Ford, O'Neil (1905-1982)/Texas Artists/Correspondence, Clippings (1 of 2 and 2 of 2).

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Box 70 “Texas Art/Texas Artists/Spruce-Swenson-Roberts” -
File: Stell, Tom (1898-1981)/Texas Artists/Clippings, Correspondence, Documents, Ephemera.

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