Making a Fresh Start in Osaka
Leading the Age of Radio in Japan

Having lost everything in the Great Kanto Earthquake, Sharp's founder Tokuji Hayakawa relocated to Osaka and made a fresh start. Once there, he soon encountered an exciting new product—the radio. Using his expertise in metal-processing technology, he produced Japan's first crystal radio receiver. Next, he turned to the challenge of making vacuum-tube radios with high sensitivity. He created numerous models that could be enjoyed at the same time by the whole family, including models with built-in speakers. Tokuji's spirit of originality and creativity was demonstrated not only in his products, but also in production methods and distribution. His company would grow to be a major radio manufacturer with a trusted reputation. Eventually, in 1935, he incorporated his company as a corporation.

Circuit diagram for the Type 35 radio

1 Recovering from the Great Kanto Earthquake and Rebuilding His Life

Establishing Hayakawa Metal Laboratories

Amid the heartbreak and hardship suffered as a victim of the Great Kanto Earthquake, Tokuji headed to Osaka in December 1923 to provide Nihon Bungu Seizo with manufacturing guidance for the Sharp Pencil. He vowed to himself that he would make a fresh start.

Making good on his commitment to Nihon Bungu Seizo, Tokuji worked together with 14 of his former employees to teach the skills needed to manufacture the Sharp Pencil. By August 1924, Tokuji had fulfilled his contract and left the company. He felt at home in Osaka, sharing with the locals a love of business and an appreciation of inner character over superficial markers of social status. He therefore resolved to try building a business in the area.

The area surrounding the city of Osaka then was tranquil rural countryside, which Tokuji found very much to his liking. A plot of land at 25 Saruyama, Tanabe-cho, Higashinari-gun, Osaka Prefecture—today, Nagaike-cho, Abeno-ku, Osaka—became the location for Sharp's current head office. Tokuji hoped to develop the land by building a large factory. He envisioned the lively, cheerful children from the neighborhood growing up and working there.

On September 1, 1924, just one year after the earthquake, Tokuji established Hayakawa Metal Laboratories (*Hayakawa Kinzoku Kougyo Kenkyusho*), marking a major milestone on the road to recovery. Initially, he employed a staff of eight, including five new workers. Later, all of his former employees who had worked for Nihon Bungu Seizo would return and work together with the others.

Hayakawa Metal Laboratories and employees (1925)

Launching Research on Radio

The business began steadily, with manufacturing and sales of metal writing instruments and parts, but Tokuji was looking for a new business area. At a time when radio was already in use overseas, an announcement appeared in the newspapers that radio stations would be set up for broadcasting in Japan, starting in 1925. Tokuji had long believed that business success required constant pioneering of new fields ahead of one's rivals. On top of that, he had a keen interest in radio.

One day, he visited Ishihara Tokei-ten (now Ishihara Co. Ltd.) in Shinsaibashi, the bustling retail and entertainment district in central Osaka. The shop, which was run by a distant relative, dealt not only in clocks, but also in imported goods. As it happened, two crystal radios had just arrived from the United States. Without hesitation, Tokuji bought one for 7.50 yen. This would prove to be a fateful encounter with radio.

Tokuji and his employees immediately disassembled the radio he had bought and began studying it. While they were thoroughly familiar with metal processing, they had no knowledge of the principles of radio or even electricity. It was the first time they had seen a radio's inner parts. Nevertheless, by examining their shape and composition—and by making effective use of the metal-processing techniques—they were soon able to make faithful reproductions.

When the parts were finished, they turned to the challenge of making a prototype of the receiver set. Since radio broadcasts had yet to begin in Japan, they set up an apparatus to generate radio signals inside the factory and experimented using a manual Morse key to send beeping test tones.

The Birth of Japan's First Crystal Radio

In April 1925, Tokuji and his team finally succeeded in assembling a radio, marking the birth of the first crystal radio produced in Japan. Test radio signals began being broadcast from a station in Osaka in June of the same year. The employees who listened to the broadcasts on a radio of their own making jumped for joy at the clear sound.

Japan's first domestically produced crystal radio

So as not to miss the opportunity of the start of radio broadcasting, the company worked to produce crystal radio sets as fast as they could. The new radio sold for 3.50 yen, less than half the price of imported models. Introduced immediately after the start of broadcasting in Japan, the radios flew off the shelves. Each radio bore the Sharp brand name, which had its origins in the popular Sharp Pencil but which also symbolized the sensitivity of the radio. At the same time, Tokuji's company also made and marketed parts for radios.

Tokuji Hayakawa (right) testing a crystal radio

Although sales were strong, Tokuji did not try to exploit the excessively high prices that were common elsewhere at that time. His company entered the market early, guaranteed its products, and maintained fair prices. In addition, they worked to accumulate capital without wasting profits. Through the development and sale of radios, the Sharp brand name gradually became known in Japan. It was the first step towards becoming an electronics manufacturer.

2 Growth as a Radio Manufacturer

Development of a Vacuum-Tube Radio

In July of 1925, the company set up a sales office in Osaka on Utsubo-naka-dori, Nishi-ku—now Utsubo-honmachi, Nishi-ku—and began wholesaling their own products, along with imported vacuum-tube radios and parts.

In Japan, crystal radios were the dominant type of radio, providing clear sound with little background static. However, these radios required the use of headphones, meaning that groups of people could not listen to them together. Furthermore, volume levels were low and reception was possible only in a limited geographical area.

By contrast, vacuum-tube radios could receive signals even in remote valleys and seaside villages, thereby making radio available to everyone. Tokuji made up his mind to popularize a vacuum-tube radio of his own devising that took its power supply from the electrical lines used for lighting. First, he produced a battery-powered vacuum-tube radio that he named the Sharp Dyne, in emulation of the imported Neutrodyne receiver. Then, in 1929, he finally introduced an AC-powered vacuum-tube radio. It performed as well as the imported models, but cost far less—about one-tenth as much.

A number of different AC-powered Sharp Dyne models were developed, featuring from three to eight vacuum tubes. Tokuji's company was able to supply radios with optimal combinations of vacuum tubes, ranging from triodes to pentodes.

Initially, the horn speaker was a separate unit. The company supplemented its line-up with a high-end Fuji Go model, which featured an image of majestic Mount Fuji on the cabinet, and an affordably priced model with a simple design.

In 1930, the company's technical team created a pioneering design featuring a box-type radio receiver with the speaker housed in the main unit case. Variations of this radio incorporating a clock/timer or phonograph were also developed.

Sharp Dyne with a horn speaker

As radio became rooted in people's lives, the Sharp Dyne rose in popularity and made Sharp a household name synonymous with radio.

The Popularity of Radio Broadcasts

In the early days of radio, listeners were treated to music, entertainment, plays, lectures, and news. Radio was embraced as a new cultural medium and spread rapidly. Live broadcasts of baseball and other sports were also popular. August 1927 saw the first broadcast of the annual national high-school baseball tournament held at Koshien Stadium in Hyogo Prefecture. And in January 1928, a sumo tournament was broadcast live for the first time. During these live sports broadcasts, people would pack the streets in front of radio retailers. 1928 also saw the start of Japan's daily radio calisthenics program, which continues to this day.

Radio calisthenics began as a way to promote fitness and health among Japanese citizens. People of all ages moved to the rhythmical piano accompaniment. (Photo courtesy of *Asahi Shimbun* newspaper)

By 1932, the number of subscribers to radio broadcasting surpassed 1 million—that figure rising to 1.4 million the following year.

Devising a New Conveyor for Mass Production

The company expanded its factory buildings nearly every year to cope with the increased production of radios. A new plant was established in Hirano, near the head office, with the first building completed in 1934. Cabinets and parts made in this factory were then sent to the head office plant to be assembled into finished radios.

Since its founding, the company had focused on efficient production through mechanization and assembly-line operations. At the end of 1936, a new intermittent belt conveyor system was introduced to the radio production line—an innovation based on Tokuji's own design.

In this conveyor system, a work platform mounted on a belt would move and then stop in front of workers for a fixed time interval. During that pause, the worker would perform a predetermined task, such as mounting or wiring parts. The stop times could be adjusted to suit the skill levels of employees, promoting improved work efficiency throughout the 23 equal steps of the assembly process. The system was said to enable production of uniform-quality radios at the rate of one per minute. With a view to optimizing overall production, Tokuji set up an engineering team to study production costs and issues such as process allocation.

In this way, radio production increased dramatically year after year, from 58,000 units in 1936, to 88,000 units in 1938, to 130,000 units in 1939.

Radio production line using the intermittent belt conveyor system (around 1936)

The Beginnings of Quality Assurance and a Service System

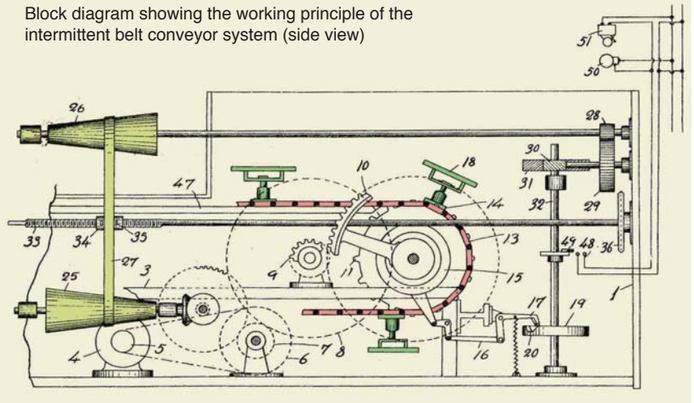
In the period shortly after radio broadcasting had begun, many domestic products lacked the sophistication and quality level of imported products, and listeners were plagued with sets that didn't work. To provide purchasers with peace of mind when using the product, the company began in 1930 to attach a repair warranty notice to the radios it sold. Retailers would repair simple failures at no charge to the customer, and by entering the details of the problem on the notice and sending it back to the company, they would receive a small reimbursement of 0.50 yen.

This system provided a way to quickly respond to problems and gave both the consumer and the retailer a sense of security, while also promoting the high quality of the company's products. In addition, it served as a valuable source of information for product improvement.

Product development was given a further boost in 1937, when the company mounted a traveling caravan—a fleet of cars that toured the country, holding trade fairs, offering repair services, and doing market research wherever they went.

Tokuji also felt it was important that everyone connected to the radio industry—from wholesalers and retailers to parts makers and competitors—should develop and expand together, so that prosperity could be shared by all. In November 1932, the company held a forum to promote measures for industry-wide prosperity. Tokuji placed particular stress on the importance of wholesalers, noting, "They are the primary sales contact for manufacturers. And from the standpoint of retailers, they are a significant presence and play the role of warehouse and financial institution." To encourage growth in the industry, Tokuji also held a debriefing session for the industry each time he returned from an overseas study tour, and consistently called for an expansion of exports.

Block diagram showing the working principle of the intermittent belt conveyor system (side view)



No. 18 is the work platform that alternately starts and stops with the movement of the conveyor belt. The action of pulleys 25 and 26 is a mechanism that enables the pause duration to be adjusted.

3 Expanding Sales by Focusing on Business Partners

Interior of the Utsubo sales office, where shelves were packed with products and parts

Expanding Sales Outlets

Opening Sales Offices and Branch Offices across the Country

Mindful of the importance of radio broadcasting, the government consolidated stations in Tokyo, Osaka, and Nagoya in August 1926 to form the Japan Broadcasting Corporation (NHK). Under the banner of this corporation, new stations began broadcasting in Kyushu, Hiroshima, Sendai, and Sapporo. Within two years, the whole country was linked in a radio program network. Seizing the opportunity presented by the launch of these broadcast stations, Tokuji's company established sales offices and branch offices throughout the country with the aim of expanding sales of receivers and parts.

Thriving in its advantageous location, the sales office in Utsubo, Osaka, was regarded as the home base. As sales increased, the number of employees grew, and the company upgraded and expanded its product line.

The company opened a Tokyo branch office in 1926, and then—to coincide with the launch of the Kyushu broadcast station in March 1927—one in Fukuoka. A trade fair targeting Kyushu wholesalers was held to generate publicity, raise capital, and celebrate the start of broadcasting. Among those invited to exhibit their products and share the cost of staging the event were Osaka- and Kobe-based manufacturers, wholesalers, and importers of parts such as vacuum tubes and batteries. A dozen shops accepted the invitation, and the fair was a great success. The Fukuoka branch office opened without any complications.

The company subsequently established branch offices in Kokura in 1932 and in Nagoya in 1935. By the end of 1937, the company had further broadened its sales network by opening branch offices in Shizuoka, Sendai, Kanazawa, Hiroshima, Okayama, Kochi, Kumamoto, and Kagoshima.

Strengthening the Relationship with Business Partners

At the beginning of the 1930s, the company set up Sharp Kotokukai, an association of Sharp radio dealers that would hold meetings to introduce new products and discuss current market conditions. The organization also afforded the opportunity for members to deepen their relationships through informal social activities, such as attending plays, thereby promoting even greater sales growth.

The company also devoted energy to supporting struggling retailers. In 1936, the company introduced a bonus coupon system that paid retailers a monetary incentive directly based on sales. When making a sale, retailers would collect the coupon attached to the product. This system of financial rewards generated valuable data about the unit sales of different models.

In 1932, two-man teams from the production and sales departments began a series of study tours visiting retailers and surveying the market. While they strengthened their relationships with the retailers, the teams were also able to hear directly from them—and from consumers—about the market penetration of Sharp products. They learned valuable information about which product components were prone to failure and about the specific needs of different regions. These marketing efforts were considered extremely sophisticated for the time.

The study tour was an example of the company's commitment to trying out new creative ideas—not only in product development and assembly-line operations, but also in the areas of sales and distribution.

Trade fair held at a restaurant in Hakata to celebrate the launch of the Kyushu radio broadcasting station

Working Early on to Expand Internationally

Export of Radio Parts Begins

In the spring of 1926, the company began to export radios and radio parts to China, India, Southeast Asia, and South America. In Japan, one year after the company had started manufacturing radios, the medium had at last caught on in major urban areas such as Tokyo, Osaka, and Nagoya.

In June 1927, Tokuji Hayakawa traveled to Shanghai, rented a prominent local restaurant for two days, and held a sample fair. It was a bigger event than the one held in Fukuoka in March and was also a great success. He was able to sell every last product that he had brought with him.

Tokuji, who was considering a full expansion into China, visited a number of the country's regions in June 1930. The following year, his company set up a sales agency in Hong Kong and staffed it with personnel from Japan. In April 1934, he opened a branch office in Shanghai, the company's first such overseas office.

The company's first overseas branch office, established in Shanghai, China

Expanding the International Sales Network

In 1933, Tokuji toured various areas of Southeast Asia over a two-month period. He gave thought not only to selling products, but also to buying local materials. In response to a question from a local newspaper reporter in Singapore, he expressed an interest in buying tin and wood to use in radio components. Reading the article published the following day, radio enthusiasts and timber merchants hoping to do business were prompted to visit him at his lodgings. The meetings were soon followed by the opening of sales outlets for Sharp radios in Singapore.

Next, Tokuji visited Bangkok, Thailand, where his company already had a representative. Tokuji had presented a five-tube radio to His Royal Highness the Prince of Kamphaengphet during his trip to Japan in 1930. Consequently, the Sharp brand name was well known in Bangkok. In fact, it was said that up to 90% of the radios in the region were Sharp products. The company was represented by Bangkok Trading Company (BTC), one of Thailand's premier radio importers. Sharp continues to do business with them to this day.

From an early time, Tokuji's company promoted foreign trade; by 1933 its annual export sales of radios alone had reached 300,000 yen. Sharp radios were later exported extensively not only to China and Southeast Asia, but also to Europe, the Middle East, Australia, Africa, and South America.

Advertising leaflet from around 1932 addressed to international trading companies. It indicates the products' ability to accommodate a variety of requirements, such as different voltages and line frequencies in various countries. It also mentions the company's willingness to customize radios to receive shortwave broadcasts—a feature not yet commercially available in Japan—as well as the products' flexible pricing strategy.

4 Incorporation and Wartime Operations

Reorganizing into an Incorporated Company

Ten years had passed since the company had successfully assembled Japan's first crystal radio set. The scope of business operations had expanded, and the company's name recognition had increased. Tokuji decided to convert his privately held company into an incorporated organization in order to promote further business expansion and gain greater trust from society through the disclosure of reliable management information.

On May 1, 1935, at the Shin-osaka Hotel (now the Rihga Royal Hotel Osaka), a meeting was held to establish Hayakawa Metal Industry Institute Co., Ltd. (*Kabushikigaisha Hayakawa Kinzoku Kougyo Kenkyusho*). Registration of the establishment of the corporation was completed the following day, with Tokuji Hayakawa appointed president. Capital at the time of the corporation's establishment was 300,000 yen (fully paid). The company employed 564 workers and owned 10,056 m^2 of factory sites, along with other buildings covering 3,181 m^2. A further investment of 200,000 yen the same month increased capitalization to 500,000 yen.

Organizational meeting of Hayakawa Metal Industry Institute Co., Ltd.

In June 1936, having cemented its foundations in the radio business, the company changed its name to Hayakawa Industrial Co., Ltd. (*Hayakawa Kinzoku Kougyo Kabushikigaisha*).

The same month, the company built on an earlier investment to take a controlling stake in Yokohama Motor Parts Manufacturing Co., Ltd., an automotive parts manufacturing company with 250 employees. Tokuji took over as president of the company, which later became Hayakawa Dengyo Co., Ltd., a specialist in fluorescent lighting fixtures.

Tokuji's main company underwent another name change in May 1942, becoming Hayakawa Electric Co., Ltd. (*Hayakawa Denki Kougyo Kabushikigaisha*). The company constructed a new wooden two-story head office building in 1943. In addition, the company established a new research center to study applications of short- and ultra-short radio waves.

Successive injections of capital meant that by April 1945, before the end of World War II, capitalization had reached 8.3 million yen.

Business-Related Social Contributions

Opening the Hayakawa Commercial School for Youth

As a child, Tokuji had few opportunities to study in school and had a difficult time studying on his own. He would, for example, learn to read *kanji* characters only after having finished his daily tasks at his master's house. With this in mind, he was strongly motivated to give employees who had only graduated from elementary school the opportunity to study. Mastering the specialized knowledge of commerce and future industry would be advantageous not only to the individual employee, but also to the company, which would benefit from the development of outstanding human resources.

April 1935 saw the issuance of the Youths' School Ordinance. This Imperial edict targeted young people who had entered the workforce after graduating from elementary school by providing them with educational opportunities while they worked in factories or offices.

In May 1936, establishment of the Hayakawa Commercial School for Youth was finally approved, and the school was established the following year. Forty students were enrolled in the comprehensive course and 108 in the regular course, with tuition provided by 15 lecturers and instructors.

Diploma from the Hayakawa Commercial School for Youth

Building that housed the Hayakawa Commercial School for Youth

Donating Products for the Community

In order to bring the new culture of radio to a wider audience, the company made ongoing donations of radios to disadvantaged members of the community.

In 1930, the company began monthly donations of radios to orphanages and homes for the aged. By 1934, the total had surpassed 200 sets. The company also made donations to hospitals and elementary schools that had lost radios due to wind or flood damage. These efforts sprung from a strong desire to serve society through business.

Radio Production in Wartime

Materials Run Short

At the beginning of the 1930s, Japan was edging towards a wartime footing. By the middle of the decade, the cost of raw materials such as metal stock had skyrocketed, and companies decided to raise prices of consumer goods. Beginning in 1934, the Hayakawa company was forced repeatedly to raise prices.

Noteworthy products of this era include the Meicho ("clear listening") No. 1 radio, introduced in 1937. This radio overcame the weakness of regenerative receivers, which featured high sensitivity but which were susceptible to noise from self-oscillation. The Meicho No. 1 incorporated a function that could be adjusted to prevent this noise, enabling broadcasts to be heard clearly.

In July 1937, war broke out between Japan and China, and controls began to be imposed on materials. Initially, radios were regarded as luxury items, and the restrictions served to reduce their production. As the war progressed, however, people grew hungry for news. Realizing the valuable role that radio played in its public relations efforts, the government loosened restrictions on radio manufacturing.

To cope with the shortage of materials, the Osaka Radio Industry Association was created in April 1938, with President Hayakawa as the founder. In September of the same year, the association—along with the Tokyo Radio Industry Association and the Japan Broadcasting Corporation—organized a committee to standardize radio equipment. It was agreed to standardize radio models and prices while pursuing greater savings in materials, improved production efficiencies, and greater ease of use for the customer.

Designs That Saved on Materials; Meeting Strong Demand

As the wartime fighting grew more intense, the supply of radio materials worsened. Nevertheless the company was able to meet strong demand by making a strenuous effort to conserve materials and improve production efficiency. To reduce the amount of metal used, engineers came up with a series of creative ideas. These included devising innovative circuitry designs, eliminating transformers, using substitute materials such as paper, and shrinking the size of components.

The company had also been actively working to capitalize on new demand from regions such as China. In September 1938, for example, it received an order for 20,000 radio sets from a Chinese Telecommunication Company. Fortunately, the Hayakawa company had unimpeded access to sufficient supplies of the materials used in export goods—even those under wartime control—and therefore succeeded in fulfilling this large order. The

Ad for the Meicho No. 1 radio
(from the industry journal, *Radio Koron*; June 20, 1937)

company also introduced to this region a superheterodyne* radio with push-button station selection. This radio's long-range reception enabled users to listen directly to major broadcast stations from the distant Japanese home islands.

Manufacturing Two-Way Radios

During the war, the company also manufactured portable two-way radios for the military. This was done to ensure the company's survival and to safeguard the livelihood of employees.

In December 1941, the Pacific War broke out, and in July 1942, military authorities asked the company to build 30 prototypes of a two-way radio for use in aviation. These radios required sophisticated technology; even specialized radio equipment manufacturers had put together no more than one or two such sets. After building a successful prototype, the company developed plans to produce an extraordinary 200 units per month by the end of 1943. Thanks to the company's expertise in assembly-line operations—gained through years of radio manufacturing—it was able to successfully achieve this goal.

To expand its production facilities, the company opened a new plant in June 1944 in Izumi-fuchu—in the southern part of Osaka Prefecture—and another one in Kyoto in April of the following year.

Radio production assembly line at the head office plant (1941)

* A superheterodyne radio-receiving circuit design shifts the received signal to an intermediate frequency, which is then amplified and demodulated. This system offers high sensitivity and is resistant to interference.

5 A Post-War Rebirth Based on Radios

Returning to Peacetime Industry—A Business Revival Driven by Radios

On August 15, 1945, the Pacific War came to an end. One week after hostilities subsided, the company harnessed its full expertise to offer customers a free radio repair service. Nearly 100 people lined up every day in front of the company's head office.

After the end of the war, long lines formed for free repairs of radio sets

For people who had long been forced to live under the austerity of war, entertainment programs on the radio had become one of the few sources of enjoyment.

President Hayakawa developed policies to adapt his business to the prevailing circumstances. First, he narrowed the company's scope to focus on producing only radios, just as before the war. Next, he aimed to revert the business to the size it was in 1941 and support the normal retirement of employees or help them find other jobs. The final policy initiative involved focusing on mass production of broadcast-station models—later, Kokumin-gata ("national-type") home radios—which had standard specifications set by the Japanese government through the Japan Broadcasting Corporation.

Starting Out as a Private Company

In August 1946, the government announced that wartime reparations were being discontinued. A special war indemnity tax of 100% was imposed on radios and wireless equipment delivered primarily to the government and the military during the war—this was effectively a form of compensation.

To deal with this, the government created a special accounting system to prevent the collapse of companies for whom this tax would be a fatal blow. Hayakawa Electric was deemed one such company. Debt consolidation and business accounting were dealt with by separating accounts into two categories: one for old debt incurred during the war and one for post-war consumer business.

Later, on December 10, 1948, the company increased its capitalization to 30 million yen and merged the old and new accounts. Released from its special accounting arrangement, the company was finally able to regain its management autonomy. The company's financial performance began an upturn around late 1948: in the four months following the increase in capitalization, net income of 3.92 million yen was posted on sales of 132 million yen.

WWII-era head office plant that survived the war

With the capital increases at the end of 1948, the company began trading its shares through the Osaka Securities Dealers Association. On May 14, 1949, the company's stock was listed on the Osaka Securities Exchange. The selling price for the first trade on June 2 was 42 yen per share. Given the economic situation at the time, this was considered an auspicious first market trade. With the public offering of stock, the company would continue its business activities as a publicly responsible institution.

It should also be noted that the company's trade union was formed on February 1, 1946, following the promulgation of the Labor Union Act in December 1945.

Focusing on the Kokumin-gata Radio

In March 1946, the Japanese government, the Communications Industry Association of Japan, and others established standards for a Kokumin-gata radio—a new standardized radio receiver intended to be sold nationwide. It carried an officially set price and was exempt from excise taxes. The company took advantage of this system to introduce the Sharp Kokumin-gata No. 1, No. 2, and No. 2-B—models that notably expanded sales.

In June 1946, the Ministry of Commerce and Industry (now the Ministry of Economy, Trade and Industry) indirectly called for increased production of radios. This request would lead to serious problems in the future; many manufacturers would later neglect to downsize their operations and would struggle with high costs everywhere they turned. Moreover, company management continued to face difficult times in trying to boost production, owing to a lack of key materials, an increase in wages, and a decrease in purchasing power due to inflation.

Prices for the Kokumin-gata radios soared, with official prices revised frequently. Finally, in August 1947, prices exceeded the point where the products were exempt from excise taxes, and a 30% tax was imposed. Sales of Kokumin-gata radios weakened considerably thereafter.

Sharp Radios over the Years

From Crystal to Vacuum Tubes to Transistors

The golden age of radio in Japan spanned the 35-year period from 1925, when broadcasts began, to 1960, when television became widespread. The wartime economy of the mid-1930s and later hampered development of technology for radios. But in homes across the nation, radio continued to serve as the family's primary source of information and entertainment.

1925 *Radio's Infancy*

Crystal Radio
Comprising a tuned circuit for picking up broadcast signals and a crystal detector for extracting the audio signal from the radio waves, the crystal radio required a receiver in order to function properly.

1929 *Radio Age Dawns*

Battery-Powered Vacuum-Tube Radio
Although the vacuum-tube radio had a speaker to amplify sound and boasted high sensitivity, its expensive battery had to be replaced periodically, making it no more than a temporary product on the scene.

1930 *Growth Period*

AC Vacuum-Tube Radio (No. 30)
Drawing its power from a lamp line, this radio featured a separate speaker placed on top of the main unit.

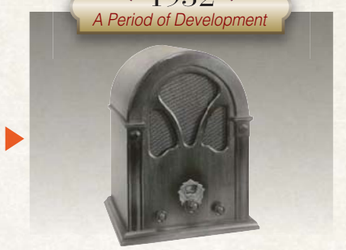
1930 *Growth Period*

Radio with Built-in Speaker (No. 21)
This radio used regenerative detection to improve sensitivity, with sound being picked up directly from different frequencies. This was the most common type of radio until the end of World War II. Sharp was the first company to make a radio with built-in speakers.

1932 *A Maturing Market*

Phono Radio (No. 53)
Sharp released a combination radio and record player, designed as a luxurious piece of furniture.

1932 *A Period of Development*



Midget Radio (No. 34)
Advancements in vacuum tube performance—including four- and five-terminal designs—enabled radios to become smaller. Sharp's midget radio was a popular addition to the company's product lineup.

1938 *Growth Slows*

Wartime Austerity Radio (Aikoku No. 1)
Tightening wartime measures restricted the amount of metal that could be used for radio parts such as transformers. Soon only government-standardized models were being manufactured.

Note: The Sino-Japanese War broke out in 1937, miring the country in war.

1950 *Business Recovers*

Superheterodyne Radio (5R-50)
Shortly before the onset of private broadcasting in Japan, there was an industry-wide switch to superheterodyne models, which offered superior sensitivity and clearer channel selection. Compact, inexpensive models became popular.

Note: Superheterodyne models were built during the war years, but these were specialized models designed to function over long distances.

1957 *The Zenith*

Transistor Radio (TR-115)
The transistor revolutionized the radio. Compact, portable radios were a hit around the world.