Setting Global Standards

(Case of Matsushita)

In the early 1970s, VCR surpassed color television to become the largest single consumer electronics product in terms of sales. By the mid-1970s, variations of this machine embodying more integrated electronics and narrower (1/2-inch) tape resulted in two formats designed exclusively for home use: the Betamax, introduced in 1975 by Sony, and the VHS (Video Home System), introduced in 1976 by the Victor Company of Japan (Japan Victor Company or JVC) and then supported by JVC's parent company, Matsushita Electric, as well as the majority of other firms in Japan, the United States, and Europe. With this model the U-Matic format was also being developed by Sony Corporation. In the case of Beta and VHS, their common ancestry and technical similarities remained incompatible, because they used different tape-handling mechanisms and cassette sizes, as well as coding schemes for their video signals that varied just enough so that tapes were not interchangeable

Beta was the first compact, inexpensive, reliable, and easy-to-lug use VCR; it accounted for the majority of VCR production during 1975-77 and enjoyed steadily increasing sales until 1985. Nonetheless**,** it fell behind the VHS in market share during 1978 and steadily lost share thereafter. By the end of the 1980s, Sony and its partners had ceased producing Beta models. *(Refer **Exhibit – 1** for the detailed of VCR production)* Technologies and markets that require years to develop, being the inventor or first mover in commercialization may not be as useful as coming into the market second or third.

In the case of VCR, the potential global market measured hundreds of millions of units. Its very scale created a window of opportunity lasting a few years, during which firms with comparable engineering and manufacturing capabilities could challenge Sony, the first mover in refining the technology for consumers as well as in making preparations to exploit the mass market. As demand grew at rates outstripping the supply capabilities of Sony or any one producer, rapid followers who were also technological pioneers stimulated the occurrence of a first bandwagon that affected the formation of alliances for production and distribution.

The Inventor's Innovation

Magnetic video recording technology was created in the United States, but numerous European and Japanese companies competed and collaborated in the 1960s and 1970s to adapt the technology to the requirements of a mass market. Ampex Corporation, a small California company, invented a video recorder for broadcasting applications in 1956. This came after several years of competition with Radio Corporation of America (RCA) to use magnetic tape (as earlier used in audio tape recorders) to record television signals, and freed the broadcast industry from a reliance on live performances or on a clumsy system of film recording. In the late 1950s, Sony, JVC, and Matsushita, as well as several other Japanese firms, began studying and improving on the $50,000-plus Ampex machine, employing novel recording-head mechanisms and solid-state electronic circuits, as well as other product and process innovations, which allowed them to miniaturize the video recorder and to reduce its price dramatically.

Design technology for video recording had been difficult for Ampex to master but proved more difficult to protect from a select handful of companies that had made audio tape recorders and then invested in the development of video recording. Although Ampex retained control of important patents, Japanese firms challenged these in Japanese courts and also explored ways to invent around them. By the mid-1960s, several firms in Japan, along with Ampex in the United States and Philips in Europe, had accumulated considerable expertise in video recording design and manufacture.

Despite a series of products through the 1960s that did not appeal to consumers because of high prices, poor picture quality, bulky housings, and inconvenient reel-to-reel formats, the Japanese pioneers continued to improve their machines until, in 1971, Sony succeeded in designing a cassette model with 3/4 inch-wide tape. This machine, called the U-Matic, was still too large and expensive for regular home use. Three Japanese firms that later competed for the home video standard—Sony, Matsushita, and JVC—signed a cross-licensing agreement for video recording patents in 1970. Philips did not join this group and pursued its own distinctive VCR design.

Although engineers and managers recognized that, a standard format would be better for consumers and producers. In fact, Sony's experience with the U-Matic had made its engineers particularly reluctant to cooperate in establishing or refining a new standard. As early as 1970, Sony had appeared ready to introduce a smaller machine that used a more sophisticated recording system and that might have proved popular with consumers. Since Matsushita and JVC were not yet ready to mass produce this type of machine, the U-Matic ended up as a compromise design, requiring a wide tape and a large cassette. The compromise thus forced Sony, by agreeing to support what became the industry standard for institutional machines, to miss a potential opportunity to enter even earlier into the home market, utilizing nearly two decades of experience with video recorder design, engineering, and manufacturing. Sony and JVC both proceeded to develop 1/2 inch-wide tape VCRs for the home and introduced them in 1975 and 1976. Meanwhile, other companies, including Ampex, RCA, Matsushita, Toshiba, Sanyo, and Philips, introduced or experimented with alternative formats.

In addition, just as Sony's Betamax was essentially a miniaturization of the U-Matic but with a more advanced recording technique, the VHS closely resembled the U-Matic, even though the recording format, tape-handling mechanisms, and cassette sizes remained different. Accordingly, it proved difficult for Sony and JVC, and the firms that carried their machines, to differentiate their products through basic features. Hence, neither Beta nor VHS could gain a technological advantage in design or manufacturing that could be sustained long enough to gain a dominant market position. Sony did establish an advantage in reputation if not in actual design and manufacturing skills because of its unique history as an innovator in home video and as primary inventor of the U-Matic. It was by no means certain, however, that the VHS—which came to market after Betamax and was backed by a small firm (JVC) with limited manufacturing and distribution capabilities—would prove superior in the global marketplace.

The Global Mass Market

Demand for a novel consumer-electronics product can rise rapidly as masses of new customers appear each year. In home video, for example, everyone with a television set was a potential customer. In contrast, professional video had been a very limited market. Machines for broadcast use were expensive and complex, and the number of buyers equaled the

number of television stations— hundreds, not millions, in the United States, Japan, and Europe combined. As a result, one firm was able to supply most of the new and replacement demand for many years- For example, Ampex had produced approximately 75 percent of all video recorders in use worldwide in 1962, and it was able to dominate the broadcast market for two decades after its invention of the video recorder in 1956.

The Beta and VHS models opened up a true mass market, allowing video recorders to parallel and then in the early 1980s to pass color television sets to become Japan's (and the world's) top consumer electronics product in production value. The vast size and worldwide structure of this new demand made it nearly impossible for any one firm to accommodate it.

> Annual production of home videocassette recorders in Japan exceeded one million as early as 1978, having commenced only in 1975, and continued to double each year until 1981. Japanese firms exported 53 percent of the video recorders they produced in 1977 and approximately 80 percent from 1979 onward. The top export destination was the United States during 1976-79, but European exports consumed a larger share during 1980-82, as VCR sales boomed with the increasing availability of prerecorded tapes *(Refer **Exhibit – 2** for the details of Japanese VCR exports)*

Europe was probably a more favorable market than the United States, so far as promotion of software is concerned. Thus, the characteristics of home video—the market's "mass" and global nature, as well as the product's technical complexity— meant that efficient mass production capacity, broad distribution channels, and clear market preferences would require years to emerge. An early mover into the market had no guarantee of a sustainable advantage from simply being first, but needed an effective strategy to capitalize on its position.

In fact, Matsushita was known for competing in that manner: monitoring a broad range of technical developments and gradually building up in-house skills while waiting for Sony, JVC, or other innovative consumer-electronics firms to introduce a new product. Matsushita would - then enter the market six months to a year later with a similar but flower-priced version, usually manufactured more efficiently.

In the case of VCR, since no single producer or coalition was strong enough to impose a worldwide standard, and since repeated efforts to bring producers to an agreement failed, the marketplace set the standard. In the drama of the VCR standardization battle, there were three sets of principal players: I) the main; protagonists. Sony, JVC**,** and Philips, sponsors of the three principal rival formats and major producers of the core product, the VCR; 2) the remaining consumer electronics producers, each of whom would adopt one of the standard formats for production and/or distribution; and 3) the producers and distributors of an important complementary product, prerecorded software.

As it played out, the crucial battle was between Beta and VHS, Sony and JVC. The facts are simple: Beta reached the market first, took 58 percent of the market in 1975-77, and fell behind VHS in 1978. For the next six years, sales of Beta-format VCRs increased every year, even as its share of the worldwide market fell every year. After being outsold four-to-one by VHS in 1984, Beta began a rapid decline to extinction.

The Impact

A three-year period, from mid-1974 to 1977, proved decisive in determining the outcome of the standardization battle that would rage on for another decade. At the start of this period, diversity characterized the positions of the world's largest consumer electronics companies with respect to home video, a market that remained wholly speculative in 1974. VCR designs based on six different incompatible formats were in late stages of development at rival companies, and three of the majors, Hitachi, Sharp, and Zenith, had no commitments at all to home video development. ***(Refer Exhibit – 3** for Home-Video Families and World Color TV Share details, 1976-1977)*

Because of the common technical heritage in the U-Matic, the Beta and VHS designs were closely comparable in cost and performance. Sony had a clear lead primarily in timing; it would take JVC roughly two more years to match the stage that Sony had achieved by late 1974. But moving first was not sufficient, in itself, to win the prize in this market; how Sony moved and what its principal rivals did also mattered. Matsushita exploited its generic skills in mass production and substantial previous experience in VCR manufacture by establishing production capacity for the VHS that exceeded the combined capacities of all other Japanese

VCR producers. JVC, meanwhile, moved aggressively to bring leading European consumer electronics firms into the VHS family, almost preempting that market from Beta.

Sony set out to motivate other VCR pioneers in adopting the Beta format, concentrating especially on winning the allegiance of Matsushita, its most formidable rival. But two premises hampered their ability to recruit allies. As Japan's leading developer of video technology, Sony believed that it should not have to delay commercialization of the Betamax in order to cooperate, and probably compromise, on the development of an industry standard with other firms. Sony managers and engineers felt that their earlier willingness to compromise on the U-Matic had been a competitive error.

> Sony first demonstrated the Betamax to representatives of RCA, an American video pioneer, in September 1974. At the same time Sony began talking to JVC and Matsushita, its U-Matic partners, about "joint development" of a home video format. But Sony did not manage these relationships well. When it approached the other firms, Sony had already begun tooling up for the Betamax, signaling to prospective partners a commitment to proceed with mass production irrespective of their support. Sony thus acted as a true first mover, perhaps believing that its lead in the market would convince other firms to follow. At the same time, having begun manufacturing preparations also made Sony less flexible, because altering the design of its machine would require expensive changes in manufacturing equipment.

When Sony demonstrated the Betamax to Matsushita and JVC in December 1974, Matsushita also questioned the adequacy of a one-hour playing time. These negative reactions to the Betamax then convinced managers at JVC that a successful machine would have to offer at least two hours of playing time and strengthened their commitment to the VHS, whose development had always proceeded on that assumption. JVC now joined RCA and Matsushita in declining to adopt the Beta format. Sony managers eventually realized that they were not in a strong bargaining position and decided to modify the Betamax for two-hour recordings. When Hitachi, another major producer of consumer electronics products, showed an interest in July 1975 in licensing the Betamax, Sony managers refused, insisting that the Betamax was not yet perfected and thus not available for licensing. It seems that Sony managers were still primarily interested in persuading Matsushita to adopt the Beta standard, rather than Hitachi; they knew by this time that JVC was working on a competing format.

Sony resumed seeking partners as soon as it revised the Betamax to play for two hours. Top executives from Sony and Matsushita met again in March 1976 to discuss adopting Beta as the common standard. In July, Sony demonstrated the latest machine to Matsushita, JVC, Hitachi, Sharp, Mitsubishi, Toshiba, and Sanyo and also appealed to Japan's Ministry of International Trade and Industry (MITI) for support. MITI officials tried to negotiate a settlement and favored Sony in these discussions, since it already had a machine in the market. Toshiba and Sanyo eventually agreed to back Beta, but the other firms decided to wait for the VHS, which JVC announced publicly in September 1976.

As a second step, toward the end of 1976, JVC moved to establish a footing in the U.S. market by negotiating with RCA. The U.S. Company rejected this offer for an OEM relationship because of JVC's small production capacity.

JVC also strengthened the position of the VHS family by moving aggressively to line up European distribution. Philips, the leader in the consumer electronics market in Europe, still commanded less than 25 percent of the market for color television in the region. With its German ally, Grundig, the number two producer, Philips was producing home VCRs based on its 1972 technology, now outmoded by the Beta and VHS innovations. Most of the other European consumer electronics firms had earlier marketed VCRs produced by Philips and Grundig, but by 1975 all of them had dropped the product. In contrast to RCA's reaction to the Japanese innovations, Philips determined to surpass the new designs with an innovative machine, for which they launched development in 1975. Meanwhile, Philips and Grundig persisted with the old design, upgraded in 1977 to provide two-hour recordings. The Philips V-2000 reached the market in 1980 but, despite impressive technical features, it was too expensive and too late. *(Refer **Exhibit – 4** for the detailed of VCR sales by country)*

Among the world’s top ten consumer electronics companies, the VHS and Beta groups were evenly matched, each selling slightly more than one-quarter of the color sets sold in 1976, whereas Philips and Grundig together accounted for less than one-sixth. But the VHS family was more successful in gaining the allegiance of smaller brands. Hence, within each of the three major geographic markets, VHS started out with a market share advantage. The VHS family—Matsushita, JVC, Hitachi, Sharp, and Mitsubishi— accounted for nearly 60 percent of color TV sales in Japan in 1976, compared to only 37 percent for Sony, Toshiba, and

Sanyo. In the U.S. market, the VHS brands, led by RCA, had a 49 percent share of color TV sales in 1976, compared to only 41 percent for Zenith, Sony, Sears, and the rest of the Beta family; And by 1978, almost all the European brands not committed to the Philips format adopted VHS, leaving Beta in a minority position.

In 1975 and 1976, all the world's leading consumer electronics producers entered the home video market. In mid-1975, Sony had stood out in a field of diverse contenders, including rival VCRs as well as potential alternatives such as videodisc. Its Beta design was the only format both ready for market and capable of performing at the level required for a mass market. By mid-1977 VHS could challenge it from a position of parity, both in product cost and functionality and in the market power of the VHS family.

Product & Quality

Did the market performance of VHS result from differentiating features, price, or quality? A comparison of models introduced during 1975-85 by Sony, JVC, and Matsushita, the major home VCR producers, indicates some differences in all three dimensions. In general, however, at no time *did* either format establish more than a transient advantage in tea- hires, prices, or picture quality. Sony increased its machine's capacity to two hours merely five months after JVC entered the market and several months before Matsushita appeared. ***(Refer Exhibit – 6** for the detailed recording playing time comparison)* Sony offered more low-priced models until 1980, when Sanyo introduced inexpensive Beta models. Nevertheless, Matsushita quickly surpassed Sony in share once it entered the VHS market in 1977, and the VHS standard was dominant worldwide by the end of 1978. Beta and VHS offered basic models at similar prices; the VHS group included more brand names, yet Sony led the market for different aspects. But Sony was unable to differentiate Beta models for a significant length of time because of the technical skills and initiatives of JVC and Matsushita, as well as those of their partners in the VHS group. Compared to Sony, Matsushita introduced both less and more expensive VCRs between 1978 and 1981 and manufactured about twice the number of model types Sony produced during the same time period (see Appendixes B and D). Other marketing measures helped VHS firms overcome Sony's image for high quality and reliability; for example, RCA and Matsushita (which marketed Panasonic and Quasar brands in the United States) both offered an extended labor warranty for their machines.

Mass Production and Distribution

Both Sony and JVC mastered the problems of mass production engineering and manufacturing, benefiting from experiences gained through earlier video recorder production. They also relied on integrated development teams for the Beta and VHS projects that brought together members with both design and operations backgrounds. JVC, which had less experience in making VCRs than Sony, paid special attention to making its VCR easy to manufacture and service by creating a relatively simple, low-cost design with fewer components and assembly steps than the Betamax — characteristics that also appealed to companies wishing to license a VCR for in-house manufacturing. In contrast, although Sony had the manufacturing expertise to produce the Betamax economically, potential licensees appeared concerned over their ability to mass produce the Beta design. *(Refer **Exhibit –7** for the detailed comparison of the special effect of Sony and Matsushita)*

Matsushita also made low-cost production a major priority as it modified the VHS design and prepared its own plants. The company spent at least fourteen months studying manufacturing issues before formally adopting the VHS standard in January 1977. Matsushita engineers knew what problems to expect, because they had accumulated invaluable experience producing earlier VCR machines, including a cartridge model once made in a plant with 1,200 workers and a monthly capacity of 10,000 units, as well as the VX cassette model, which Matsushita had made in 1976 before switching to the VHS. Matsushita not only emphasized a reduction in parts but also invested in manufacturing automation and scheduled large production runs, anticipating that its vast distribution system would enable it to sell a great number of VCRs. Matsushita's ability to deliver low-priced VCRs with an increasing variety of features also helped it undercut Sony prices and win contracts to supply machines to overseas distributors—arrangements that further increased Matsushita's scale of operations and ability to justify additional investments in product development and automation. Managers at Matsushita believed that the manufacturer who would dominate the world market would be the company that captured the largest share of the U.S. market. Meanwhile, Matsushita took a strong interest in RCA's distribution resources. These mutual interests brought RCA and Matsushita together in negotiations for an OEM agreement after discussions broke down between RCA and JVC, which did not have the manufacturing capacity to supply RCA with the volume of machines it wanted.

> In February 1977, apparently to the astonishment of Matsushita executives, RCA requested a VCR that "could record a football game." This meant a recording time of at least three hours. Rather than ending the negotiations, Matsushita launched an intensive effort to double playing time from two to four hours by using the approach Sony had taken to double the playing time of its one-hour machine: halving the width of each recording track (called the track pitch) as well as slowing the recording speed. Matsushita put seventy engineers on this project alone and achieved the increase in playing time in merely two months; it then set up production capacity for 10,000 units per month within six months. By the end of March 1977, Matsushita had an agreement to supply RCA with approximately 50,000 four-hour VCRs by year's end.

> In 1978, because of Matsushita's massive capacity, the VHS group accounted for approximately 66 percent of the total Japanese VCR production capacity of 191,000 units per month. Matsushita—not JVC—thus proved instrumental in winning over RCA and pushing the VCR competition toward the areas where Sony was weakest: low prices and mass distribution as well as longer playing and recording times. JVC personnel opposed a doubling of the playing time, arguing that this constituted a "bastardization" of the VHS (that is, a compromise in picture quality), and they refrained from collaborating with Matsushita in pursuing this feature. JVC eventually built a two-speed (two- and four-hour) machine in August 1977, primarily to satisfy its OEM partners, but not until July 1979 did it introduce such a machine commercially under the JVC brand name. JVC, which had about one-tenth the sales volume of Matsushita, also took six months to build a machine with four-hour play and twelve months to achieve a monthly capacity of 10,000 units.

Most important, the nature of competition changed as a result of Matsushita's alliance with RCA. First, momentum clearly built up for VHS in the U.S. market as General Electric, Sylvania, Magnavox, and Curtis Mathes scrambled to join this group in 1977, under the rationale that the format RCA supported would probably become the dominant machine in the American market. In fact, Sony had trouble matching the prices of both Matsushita and JVC in the low end of the VCR market between 1979 and 1981. Sanyo took over as the primary supplier of the lowest-priced Beta machines, but it did not have the range of alliances or the distribution channels to which Matsushita had access.

Until the early 1980s, that difference did not matter much in the marketplace. The VCR was broadly perceived to be a niche product, appealing primarily to certain demographic segments. In 1980 and 1981, with VCR ownership in only 5 to 10 percent of television households in most advanced countries, forecasts typically projected a leveling of demand at penetration levels of 15 to 30 percent in the late 1980s. Europe stood at the leading edge of this change. VCRs began to achieve mass-market penetration in Europe earlier than elsewhere, apparently due to the availability of fewer broadcast channels there. In the United

States, aggressive steps by RCA in the late 1970s contributed significantly had well-developed ideas about the consumer market for recorded video programming. To promote its VCR in 1978, RCA developed an important alliance with Magnetic Video Corporation of America (MVCA).

Questions

1. Why technological lead alone is not sufficient to compete in the global market?
2. How was technological compatibility important for the Home Video business?
3. What were the important factors to achieve global standard in Home Video business?
4. Why did standard setting strategy work in Home Video business?
5. What are current businesses where global standard setting is in vogue?

Exhibit – 1

VCR Production and Format Shares, 1975-1984 (percent)

	1975	*1976*	*1977*	*1978*	*1979*	*1980*
BETA Group						
Sony	100	56	51	28	24	22
Others	—	5	5	12	15	11
Subtotal	100	61	56	40	39	34
VHS Group						
Matsushita						
Others Subtotal						

	1981	*1982*	*1983*	*1984*	1989
BETA Group					
Sony	18	14	12	9	
Sanyo	9	10	8	6	
Toshiba	4	4	4	3	
Others	1	1	2	2	
Subtotal	32	28	25	20	0
VHS Group					
Matsushita	28	27	29	25	
JVC	19	20	16	17	
Hitachi	10	10	11	15	
Sharp	7	7	9	9	
Mitsubishi	3	3.	3	4	
Sanyo	—	3	4	5	
Others	2	2	2	5	
Subtotal	68	72	75	80	100

Sources: Same as Table 2 plus Yoichi Yokomizo, "VCR Industry and Sony" (MS Thesis, MIT, Sloan School of Management, 1986).

Exhibit – 2

Table 3
Japanese VCR Exports, 1975–1983
(value in billions of yen, production in thousands of units)

	Value	*Units*	*Export (%)*	*Exports by Region/Total Exports (%)* *N. America*	*Europe*	*Other*
1976	31	139	48	75	17	8
1977	66	402	53	85	8	7
1978	126	973	73	60	28	12
1979	222	1,671	78	46	33	21
1980	444	3,444	78	32	42	26
1981	854	7,355	84	34	44	22
1982	1,080	10,661	82	27	52	21
1983	1,261	15,237	80	41	38	21

Source: Nomura Management School, "VTR Sangyo noto" [VTR industry note] (Tokyo, 1984), 43.

Exhibit – 3 Home-Video Families and World Color TV Shares, 1976-1977

Company	*Format*	*1974 VCR Commitments*	2976 *World Hank*	*Color TV Sales Share (%)*
Sony	Beta	Betamax prototype	3	7.4
Sanyo	"	V-Code in Japan	5	6.2
Toshiba	"	V-Code in Japan	6	5.8
Zenith	*'	none	4	6.4
Total Beta			-	25.8
Matsushita	VHS	VX-100 prototype	1	12.7
Hitachi	"	none	7	5.6
RCA	"	Selectavision prototype	8	5.2
Sharp	"	none	10	3.1
Total VHS				26.6
Philips	Philips	N-1500 in Europe	2	11.5
Grundig	"	N-1500 in Europe	9	3.8
Total Philips				15.3

Source: For color TV sales: Harvard Business School, "The Television Set Industry in 1979" (Boston, Mass., Case no. 9380-191. 1980).

Exhibit – 4

VCR Sales by Country and Format (1983)

	Unit Sales	VHS	*Beta*	V-2000
	(millions)	%	*%*	%
USA	4.1	75	25	0
Japan	3.4	70	30	0
Britain	2.3	74	24	2
W. Germany	1.5	60	20	20
France	0.4	70	20	10
Italy	0.2	60	20	20
Above Totals	11,9	72.	25	3

Source: Nomura Management School, "VTR Sangyo noto," 5.

Exhibit – 5

Recording-Playing Time Comparison

fear/Month	*BETA*	VHS
1975/5	1 hr. (Sony)	
1976/10		2 hr. (JVC)
1977/3	2 hr. (Sony)	
1977/10		4 hr. (Matsushita)
1978/10	3 hr. (Sony)	
1979/3	4.5 hr. (Sony)	
1979/8		6 hr. (Matsushita)
1979/8		4 hr. (JVC)
1979/12		6 hr. (JVC)
1982/3	8 hr. (Sony)	
1982/9	5 hr. (Sony)	

Source: Itami Hiroyuki, *Nihon no VTR sangyo: naze sekai o seiha dekita no ka*

Exhibit – 6

Special Effects Comparison (Sony and Matsushita)

Introduction Date (Year/Month)

	Sony	*Matsushita*	*JVC*
Wireless Remote	1977/3*	1977/6	' 1979/6
1/2-Speed Machine	1977/3-[1]	1977/6	• 1979/8
Slow/Still	1979/3	1978/7	1977/12*
Portable VCR	1978/9	1980/2	1978/2[211]
1/3-Speed Machine	1979/3*	1979/8	1979/12
Scan/Slow/Stili	1979/3*	1980/6	1979/8
Stereo Recording	1980/7	1979/8*	1979/8*
Hi-Fi	1983/4*	1983/5	1983/11
One-Unit Camera-Recorder	1983/7*	1985/1	1984/3

*rnarks the Best to introduce the feature.

Source: Yokomizo, "VCR Industry and Sony"; and Appendixes B, C, and D

Details of the Photographs:

1. Video recorder for broadcasting applications in 1956 by Ampex Corporation

2. Sony's Betamax

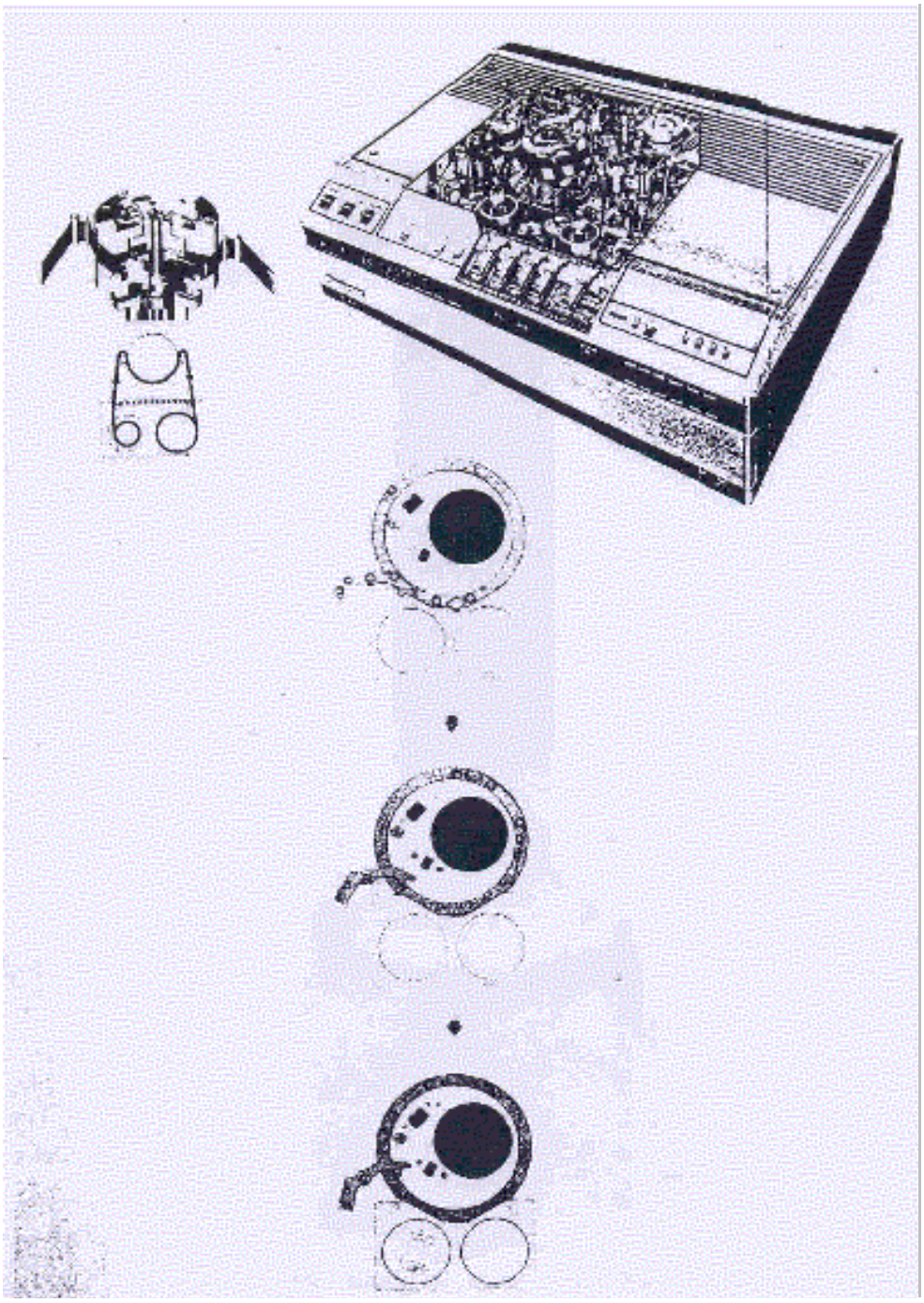
3. *Cassette Size Comparison* • Tape sizes shown are, from left, VHS, Beta, 8mm, and audio. The smaller Beta tape size made it more difficult for Sony to increase the recording time of its VCRs- (Photograph reproduced courtesy of the Sony Corporation.)

4. *The Philips* VCR "The machine shown is an early model in the Philips VR-2000 series. Although it was technically well designed, the Philips VCR, incompatible with both the VHS and the Beta systems, lost out in the marketplace. (Photograph reproduced courtesy of the Philips Company.)

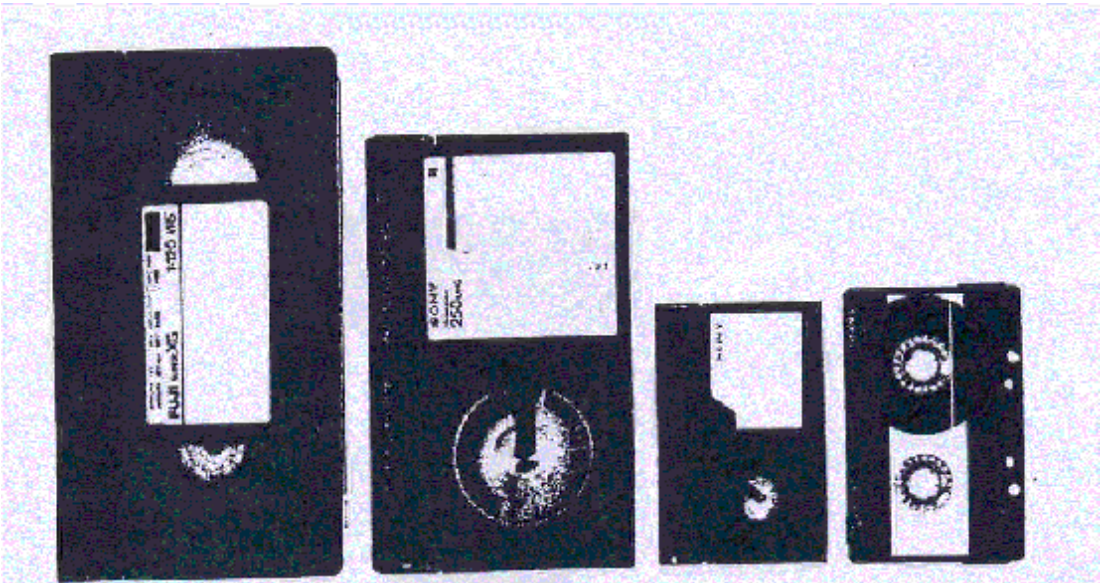
5. *Betamax in Production* • This photograph shows an early Sony Betamax VCR on the assembly line at the company's Kohda factory. (Reproduced courtesy of the Sony Corporation.)

6. *Sony Camcorder* • Shown above is Sony's 8mm Video CCD-V8 model, with an 8mm videocassette tape. Sony was able to exploit the market for home movies more successful than that for VCRs. (Photograph reproduced courtesy of the Sony Corporation.)

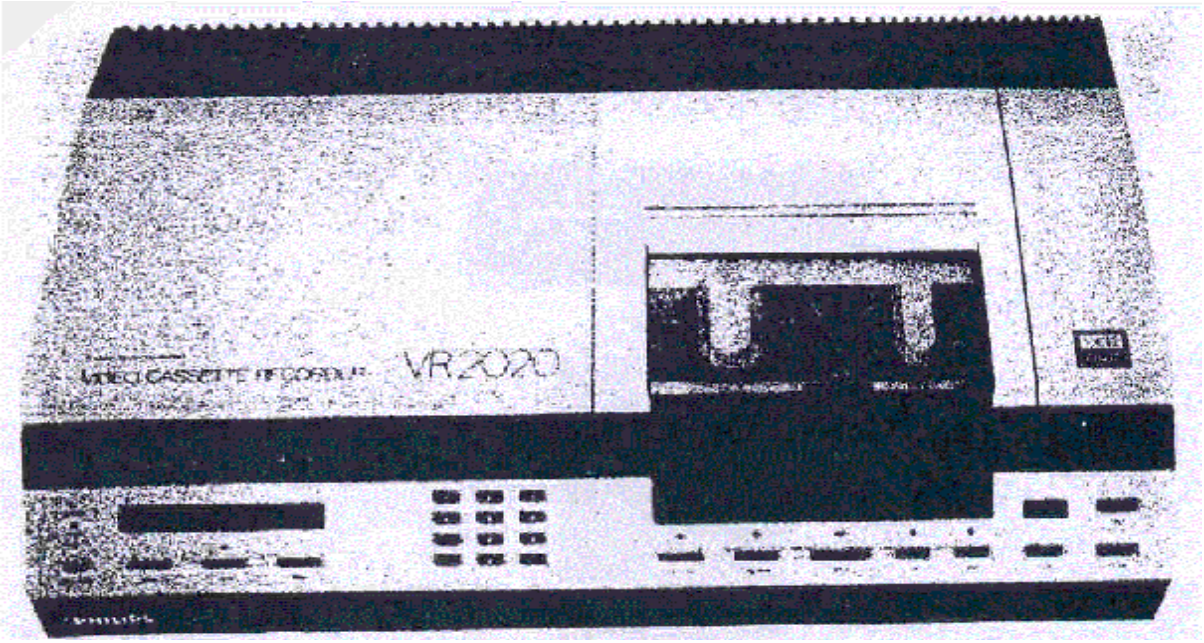
Photograph No – 1



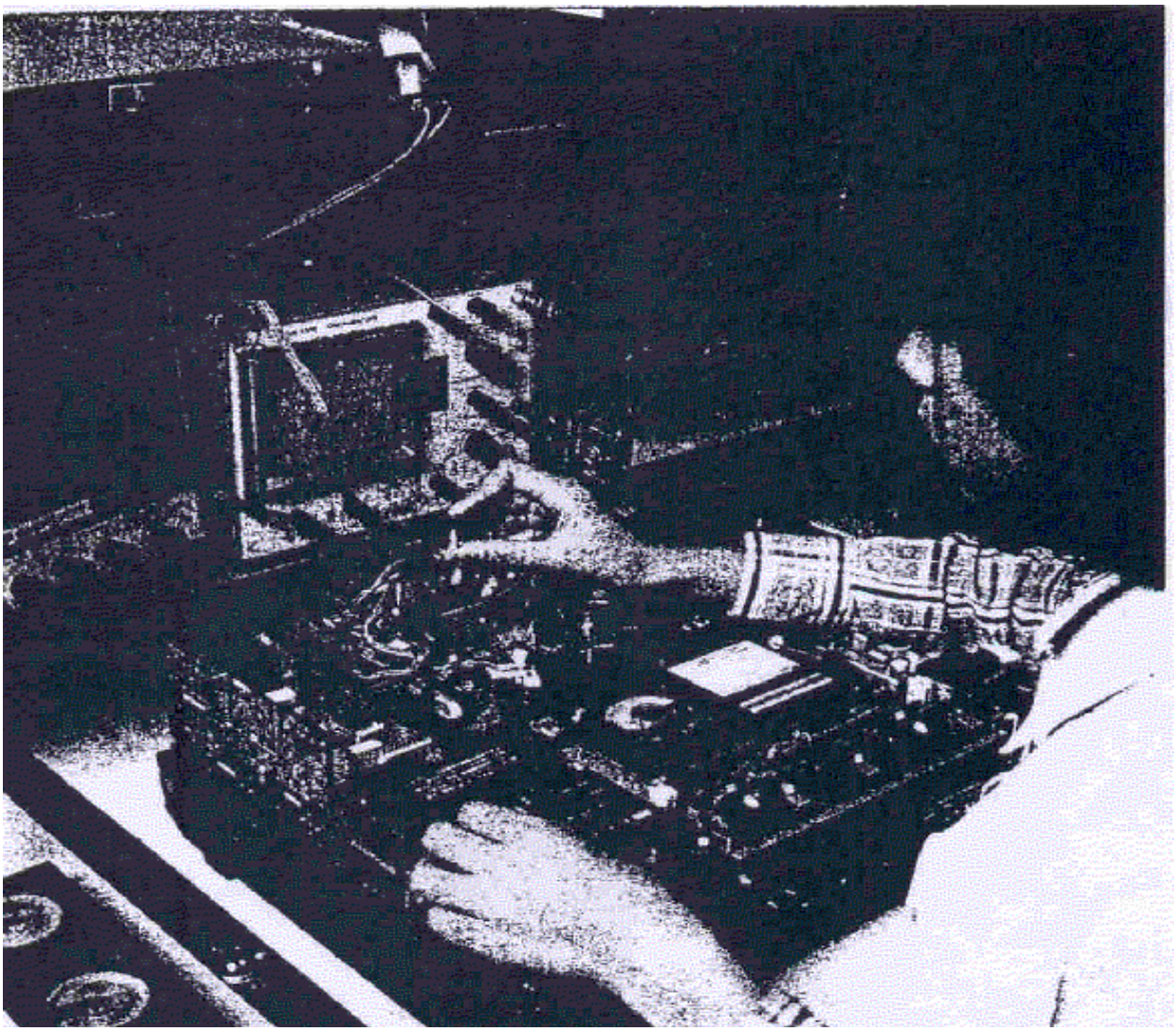
Photograph No – 2



Photograph No – 3



Photograph No – 4



Photograph No – 5

Photograph No – 6