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Barco Projection Systems (A): Worldwide Niche Marketing

On Saturday morning, September 23, 1989, Erik Dejonghe, Frans Claerbout, and Bernard Dursin were drafting a crucial presentation that Dejonghe was scheduled to make to the Barco N.V. board of directors on Monday. As senior vice president and chief operating officer (COO) of Barco N.V., with responsibility for Barco's Projection Systems Division (BPS), Dejonghe had to respond to a competitor's recent move that threatened the heart of the division's sales. Claerbout, the general manager of BPS, and Dursin, in charge of managing Barco's distribution subsidiaries and coordinating worldwide marketing of projectors, had both worked closely with Dejonghe to formulate the company's options.

One month earlier, the Sony Corporation surprised BPS and the rest of the industry by unveiling its 1270 "superdata" projector at the Siggraph trade show in Boston. At Siggraph, Sony's product seized first place as the industry's highest-performing projector from BPS's BG400. More damaging, the 1270 was rumored to be priced 20% to 40% below the established market price in its performance class. The industry saw the 1270's positioning as an attempt to widen the market through lower prices. For BPS—a small, batch manufacturer—the 1270's combination of low price and high performance threatened both to collapse its traditional market segmentation and drop prices to untenable levels. Dejonghe estimated that BPS stood to lose as much as 75% of its forecast 1990 profits.

The 1270 introduction had been timed to prevent competitive response; the industry's most important trade show, Infocomm, was scheduled to take place in the United States in January 1990. Major customers, industry analysts, and dealers would be there, and BPS's performance would determine its sales for the rest of the year.

Barco's Projection Systems Division

Barco Projection Systems (BPS) was the second-largest division of Barco N.V., with 350 employees, and turnover of 1.39 billion Bfr ($35 million)[1] in 1988 (**Exhibit 1**). Headquartered in Belgium, the

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[1]For this case, one U.S. dollar is equal to 40 Belgian francs (Bfr). The actual value of the dollar was extremely volatile during the period covered.

Research Associate Krista McQuade prepared this case under the supervision of Professor Rowland T. Moriarty. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management. Historical information has been condensed. This version of the case was revised by Professor Benson P. Shapiro.

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division had been formed in the early 1980s to pursue the emerging technology of video projection. The division had grown rapidly throughout the 1980s. In 1988 it represented 23% of Barco N.V.'s turnover

Background: Barco N.V.

Barco N.V. began in 1934 as a producer of radio broadcast receivers. In 1948, it built its first television receiver, and from then on consumer TV formed the bulk of its sales. As a small company, Barco competed successfully by carving out a market on the basis of its R&D strength and product quality. From 1955 to 1975, the company grew rapidly, expanding into broadcast monitors and professional video equipment. At the end of the 1970s, however, during the global recession that followed the 1977 oil supply shock, demand for Barco's consumer products sagged. In response, the company redefined its focus from consumer to industrial markets. In 1989, Hugo Vandamme, Barco's president and CEO, recalled that period:

> We knew that as a small, batch manufacturer we could not have continued to survive in markets for consumer products. Instead, we redrew our strategy to focus on top-of-the-line products in niche markets. In one instance, in 1983, we went as far as to say "no" to a customer asking for 15,000 computer monitors. We were able to turn that order down because we had spread our operations out and become involved in other markets. We had a clear vision of who we wanted to be, how we wanted to operate, and where we wanted to compete. Vision is what counts.

The company's strategy throughout the 1980s comprised three main elements. First, Barco committed itself to becoming a leader in a variety of distinct, but complementary, niche markets. The company entered a new activity only if it had an in-depth knowledge of the market and the technology involved and if it could be among the top three manufacturers. Second was a strong commitment to research and development; throughout the 1980s, between 8% and 10% of its annual turnover and 15% of the company's employees were dedicated to R&D. And third, in addition to growth in its businesses, the company sought to expand its international presence in sales, product development, and production. In 1988, Barco launched a global expansion campaign for acquisitions and joint ventures abroad. Three major acquisitions in the first half of 1989 totaled 4.4 billion Bfr ($110 million). In that same year, Barco reorganized its operations into seven autonomous divisions, each with its own research, product development, production, marketing, and sales.

In 1989, with 2,400 employees, Barco N.V. was one of the top three worldwide manufacturers in each of its product lines: automated production control systems, graphic arts, computer-aided design, and industrial projection. As a result of the company's early 1989 acquisitions and expanding sales in several key markets, turnover was expected to grow 50% in 1989. A number of international awards testified to Barco's technological lead in several fields. In 1988, for example, the company received the international Emmy Award for its studio monitors. The year after, BPS won the Hi-Vi Silver Award in Japan, given for the product contributing the most to electronic visualization technology.

BPS Organization Within Barco N.V.

As part of the divisionalization of Barco N.V.'s operations in 1989, President Hugo Vandamme and Senior Vice President Erik Dejonghe divided responsibility for products between them; BPS reported to the latter. Dejonghe, who assumed his current position at the time of reorganization, was part of the team that propelled Barco's industrial projection activities throughout the 1980s. Joining Barco in the early 1980s, he was promoted in 1983 to president of the division that fabricated TVs and large screen projectors. Frans Claerbout was head of the division's R&D department, while Bernard

Dursin was in charge of marketing and sales. Dejonghe, Claerbout, and Dursin worked closely together on projectors throughout the decade.

In 1989, Claerbout was promoted to vice president of Barco N.V. and named general manager of BPS. Dursin, also named a Barco N.V. vice president, became general manager of Barco International, a group that managed the marketing of certain Barco product lines worldwide, including projectors. Claerbout's and Dursin's offices remained within shouting distance of each other, however, and they continued to collaborate on projectors. Dursin managed relations with the division's distributors, and, in addition, played a leading role in setting prices for projectors worldwide. Three regional marketing managers, who reported directly to Claerbout, were responsible for sales support to all of the division's distributors. (See **Exhibit 2** for BPS's organization chart.)

BPS Products

BPS designed, manufactured, and marketed sophisticated video projectors for industrial applications. Video projectors recreated an image electronically, and Barco's offerings could be connected to TVs, VCRs, and most recently to computers. They were used to project images and information onto large screens, for large-audience viewing (see **Exhibit 3** for a diagram of the unit). BPS did not invent video projection, but throughout the 1980s, it played a key role in the development of niche market applications for the technology. By 1989, BPS had developed three lines of projectors: video, data, and graphics.

All based on the same design, BPS's projectors comprised three major components—tubes (3), lenses (3), and electronics. The division's product line was built primarily around a 7" tube. BPS's traditional strength was in electronics; given the same lens and tube combination, BPS could achieve measurably better performance than its competition in each of the main areas of evaluation. In 1989, the most important considerations for evaluating an industrial projector's performance were brightness (measured in lumens), image quality, and resolution. A projector's three components worked together to provide particular results. In general, the tubes, lenses, and electronics represented 15%, 20%, and 50% of the projector's cost structure, respectively. The housing and mechanics constituted an additional 15%.

What differentiated BPS's product lines was *scan rate*, which measured the speed at which a projector was able to read and process incoming electronic signals. BPS used scan rate to segment its markets; as the sophistication of the application for BPS projectors increased, so did scan rate. BPS's *video* projectors were designed for compatibility with standard video sources, such as broadcast TV and VCR, and scanned at 16 kilohertz (kHz), or 16,000 lines per second.[2] Its *data* projectors scanned at 16 kHz to 45 kHz, and could display input from personal computers as well as video sources. Its *graphics* projectors, BPS's most sophisticated products, scanned from 16 kHz to well above 64 kHz, and accepted input from powerful computer-aided design and manufacturing (CAD/CAM) systems, as well as from video and data sources. A projector needed to match the scan rate of its source to produce a clear picture; Barco's graphics projectors would not be compatible with any computer scanning higher than 64 kHz. BPS was continually upgrading the scan rates of its most sophisticated projector line to match advances in computer technology.

In 1989, BPS was well established in a variety of entertainment, training, and presentation markets. Board rooms, training centers, discotheques, classrooms, airplanes, and betting shops around the world had installed Barco projectors. The monthly sales log of one of BPS's European distributors, for example, listed the sale of four data projectors to the Commission of the European

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[2] 16 kHz = 30 frames of information per second x 533.3 lines per frame.

Economic Community (E.E.C.) for video conferencing, five video projectors to a chain of resorts for entertainment rooms, and five data projectors to Groupe Bull, a large French computer company, for training centers. IBM had been one of BPS's best customers throughout the 1980s, having decided in 1984 to equip all its U.S. training centers with Barco projectors.

In addition, BPS was pursuing a number of more specialized markets such as process control and simulation, which used data and graphics projectors. In 1989, BPS installed a series of projectors in the process control room of the U.S. Union Pacific Railroad, which displayed more than 23,000 km of track on a 200-foot-wide screen. Barco projectors were also found at the process control centers for the English Channel tunnel project, in factories, and in flight simulation rooms for military and aerospace applications.

Evolution of BPS's Product Lines and Markets

Barco N.V.'s involvement in projection systems began in 1981, when it developed a video projector for showing motion pictures in airplanes. The projector, called the BarcoVision 1 (BV1), was priced at 450,000 Bfr ($11,250), and sold strongly in the U.S. and European markets. As the company began to investigate other applications for its technology, Dejonghe, Claerbout, and Dursin presented their views on the future of projection to Barco's board of directors. They believed the company could pursue one of three directions: (1) it could downgrade its technology to suit consumer video applications; (2) it could upgrade its technology for long-distance, high-performance video projection; (3) or, it could enter the untested market for computer applications.

In their presentation, Dejonghe, Claerbout, and Dursin related their discussions of a possible computer-compatible projector with IBM. Developing the computer application, they learned, was feasible, but scan rates would have to be increased to match a computer's faster electronics. Moreover, the projector would have to be designed with enough flexibility so that computer companies with different standard scanning frequencies could use it. But Dejonghe and the others felt that the complexity of the application would work to Barco's advantage by keeping larger firms out of the market. They also thought the application could expand projection markets significantly. The board voted to follow their suggestion and made Dejonghe the new president of the TV and projector division.

In 1983, the division's sales were split 80%/20% between TV and projectors. Dejonghe set out to reverse that ratio. By the end of 1983, BPS had introduced the BarcoData 1 (BD1) the first computer-compatible projector in the marketplace. Priced at 540,000 Bfr ($13,500) and able to scan to 18 kHz, the BD1 was immediately successful in corporate presentation markets and elsewhere. In 1984, BPS introduced two more projectors—the BV2 (395,000 Bfr, $9,875) and the BD2 (590,000 Bfr, $14,750), which incorporated engineering advances permitting higher scan rates and, thus, broader compatibility. From 1984 on, BPS's video and data lines continued to evolve, keeping pace with breakthroughs in design, improved components, and, in the case of data projectors, with ever-changing computer technology. In 1986, BPS began work on a graphics application for its technology.

BPS developed its graphics projectors to handle input from CAD/CAM sources, which required upgrading a data projector's scanning frequency to 64 kHz and above. (BPS's most powerful data projector at that time, the BD3, scanned up to 32 kHz.) Dejonghe recalled how the division's market segmentation scheme was formalized:

I remember when we decided to create a graphics segment with a machine scanning at 64 kHz and above. Limiting the scan rate on our data projectors would frustrate some end-users.

Our plan was to respond to that frustration by offering a graphics projector. We could have made it one machine, but not sold it for the highest price.

Dejonghe, Claerbout, and Dursin decided to limit video-only projectors to a scan rate of 16 kHz; data projectors to a scan range of 16 kHz to 45 kHz; and graphics projectors, their newest line, to a scan range of 16 kHz to 64 kHz and above. In June 1987, BPS introduced its first graphics projector, the BarcoGraphics 400 (BG400), for 1 million Bfr ($25,000). The BG400 was the industry's most sophisticated projector, scanning at up to 72 kHz. By 1989, the price of the BG400 had come down to 960,000 Bfr ($24,000). (**Exhibit 4** displays a time chart of BPS's product evolution.)

By September 1989, BPS was looking toward its next generation of products—digitally controlled projectors. Currently, all adjustments to BPS projector settings were carried out manually. The new projectors would incorporate digital technology to allow a projector's mechanisms to be controlled by a hand-held remote. BPS planned to first introduce the technology in the data segment, and then into the graphics and video segments. BPS engineers had field-tested its first digital data projector, to be called the BD700, and were completing all modifications. The BD700, to be priced at 640,000 Bfr ($16,000), was scheduled for full production and delivery in October 1989.

Frans Claerbout summed up the forces driving the evolution of Barco's projection product line throughout the 1980s as (1) the constant search for the best possible image; (2) flexibility toward inputs; and (3) increasing user-friendliness. Product evolution, he explained, was "more a result of engineering solutions to problems that arose than of a specific development plan." Barco's competition in industrial projection had adopted its practice of segmenting markets by scan rate. Video, data, and graphics had become the standard definition for each market by 1989.

Projector Markets

Through 1994, the worldwide market for projectors was expected to grow 8.5% per year. Growth rates for the product and geographic segments of the market, however, varied widely (see **Table A** and **Table B**).

Table A   Product Segment Growth, 1988

	1988 (% units)	Predicted Annual Growth, 1989-1994	Price Range
Video	63%	.8%	200,000-280,000 Bfr. ($5,000-$7,000)
Data	33%	12.3%	320,000-600,000 Bfr. ($8,000-$15,000)
Graphics	4%	40.2%	800,000-960,000 Bfr. ($20,000-$24,000)
Total	100.0%	8.5%	200,000-960,000 Bfr. ($5,000-$24,000)

Table B   Geographic Segment Growth

	1988 (% units)	Predicted Annual Growth, 1989-1994
United States	50%	9.0%
Western Europe	36%	11.5%
Asia	12%	18.0%

BPS in 1989

In September 1989, the data segment represented the heart of BPS's sales for both units and revenues (see **Table C**). Because the video segment was moving toward commodity, BPS was concentrating less and less effort there. BPS was the acknowledged technological leader in the high end.

BPS anticipated that the worldwide market for industrial projection would continue to expand for at least five more years before being superseded by new technologies. In 1989, the division's principal products were the BD600, which scanned to 45 kHz, and the BG400, which scanned to 72 kHz. The two projectors sold in 1989 for 480,000 Bfr ($12,000) and 960,000 Bfr ($24,000), respectively (**Exhibit 5**). BPS's main line of video projectors sold for 280,000 Bfr ($7,000). BPS sold 4,400 units in all three categories in 1988.

Table C   BPS Sales by Segment, 1988

	% units		% revenues		% margins	BPS Market Share (%)	BPS Projected Annual Unit Growth Rate 1989-1994 (%)
Video	35		23		20	8	1.4
Data:	53		54		51	23	12.3
% BD600 of BPS total data		79		67			
Graphics:	12		23		29	55	25.0
% BG400 of BPS total graphics		85		80			
Total	100		100		100		

Distribution

In 1989, BPS had a two-step distribution system, with 45 distributors and approximately 400 dealers worldwide.[3] The division owned four of its distributors—in Belgium, France, the United Kingdom, and the United States; the other 41 operated independently but were Barco-exclusive for projectors. Fully-owned distributors represented 61% of BPS's total unit sales, 61% of its revenues, and 59% of its margins. By individual product, they represented 57% of video unit sales; 61% of data units; and 75% of graphics units.

BPS established a distributor price in Belgian francs for each product. The distributors, in turn, set their own price to dealers. On average, prices in the United States were 15% lower than in Europe. The typical pricing relation appears in **Table D**.

Table D   BPS's Pricing Index

	List Price	Actual Price	Comments
BPS	100	100	41% direct cost, 59% gross margin
Distributor	142	142	30% margin, 12% import duties and freight
Dealer	204	173-184	List price calculated with 30% margin Street price incorporates discounts of 10%-15%

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[3]BPS could only estimate the number of dealers carrying its products worldwide, since most independent distributors were reluctant to disclose exact figures.

Dealers carrying Barco projectors ranged from "box" dealers to systems dealers. The box dealers, normally found in large cities, sold projectors on the basis of cost alone, providing no service or expertise. Twenty percent of BPS's dealers were "box," and 90% of box sales were video projectors. Systems dealers, at the other extreme, had the know-how to integrate and install equipment packages according to the end-user's individual needs. Often these systems involved more than one brand of equipment. Given the complexity of Barco projectors—particularly its data and graphics models—80% of the company's dealers were the systems type.

Projector dealers typically carried three manufacturers' projectors, selecting a line for the low, middle, and high ends of the market—although these could overlap. These dealers also rounded out their sales with other audio-visual equipment such as overhead projectors, lighting, screens, and consumer electronics. A typical dealer in the United States had turnover ranging from 120 million Bfr ($3 million) to 800 million Bfr ($20 million). About 8% to 10% of revenue came from after-sales service.

Although a dealer's ideal margin on projectors was 30%, fierce competition resulted more often in margins of 15% to 20%; occasionally a dealer might go as low as 5% to preserve a customer. Dealer overhead, however, averaged greater than 5%. Margins on service were higher, typically 25% to 35%, and sometimes as high as 70%. Dealers processed information from manufacturers, held vendor fairs and training sessions, and sent out mailings. Barco's dealers were required to attend sales and technical courses given by the distributor, and to hire a certain number of Barco-approved technicians. In return, BPS promised price protection for unsold units when prices dropped, and stable pricing between the time of first customer contact and final order, generally three to six months.

Barco projectors had a dealer reputation for the highest quality final image and excellent reliability once fully installed. Dealers complained, however, that the machines were unnecessarily complex—designed to win awards, not be end-user friendly. Dealers frequently encountered complications in installing equipment. End users, too, often found BPS's control panels and instructions too complex. BPS's engineers contended that many of the problems arose when the instruction manual was disregarded.

The typical end user purchased a new projector every five years. With an eye to ever-increasing computer scan rates, customers tended to purchase more performance in a projector than they needed.

Competition

In 1989, three companies competed with Barco in the data and graphics segments of the market for industrial projection: Sony, Electrohome, and NEC. Several other firms, including Panasonic, Mitsubishi, and General Electric, competed primarily in the video and low-scanning data segments and were not considered major competitors to BPS. In data projection, Sony held the largest percentage of the marketplace, followed by Barco, Electrohome, and NEC. In graphics, BPS was in first place with 55% of the market. BPS's only major competition in the graphics segment was Electrohome, with 44% (see **Table E**). **Exhibit 6** lists the products of each major competitor.

Table E   Market Share of the Major Competitors, 1988 (as % of total units sold)[a]

		Barco	Sony	E.H.	NEC	Other
Europe	Data	35	35	8	6	16
	Graphics	55	--	43	--	2
North America	Data	16	62	14	8	--
	Graphics	60	--	40	--	--
Far East	Data	15	30	7	23	25
	Graphics	15	--	80	--	5
General Total	Data	23	49	11	9	8
	Graphics	55	--	44	--	1
TOTAL[b]		25	45	14	8	8

[a]To be read horizontally: "Barco held 35% of the market for data projectors in Europe, versus Sony's 35%, Electrohome's 8%," etc.

[b]Omits video

The Sony Corporation, headquartered in Tokyo, Japan, was a diverse manufacturer of consumer electronics, with 1988 turnover of 460 billion Bfr ($11.5 billion). Industrial projectors, manufactured at the Sony Projectors division, were estimated to represent 1% of the total company's turnover. Sony was the main player in the video segment of the projection marketplace, with 50% of all units sold. In data, Sony held 49% of total units sold; however, its most powerful projector in 1989, the 1031, scanned at only 35 kHz. In 1988, the company's product mix was 66% video and 34% data, on a total of 15,000 units.

Typically, Sony projectors were positioned below Barco's in terms of performance (scan rate, brightness, image quality, and resolution), and were, on average, 15% lower in price. BPS guessed, in addition, that Sony had fewer engineers dedicated to projection than BPS. BPS expected Sony's next product introduction to be a higher-performance data projector, to be unveiled in the fall of 1989, with an upper scanning limit between 46 kHz and 50 kHz. The division also expected Sony to enter the market with a graphics projector in late 1990.

Sony sold projectors through its worldwide network of captive commercial video distributors. In turn, these distributors worked with more than 1,500 dealers across the globe. It was estimated that 50% of Sony's dealers were box dealers. Its extensive dealer coverage—Sony had 500 dealers in the U.S. market versus BPS's 100—resulted in a low street price for Sony projectors. Although dealers used 30% margins to figure list prices for both Sony and Barco projectors, Sony units were typically discounted 15% for the final sale, while Barco units were discounted 10%. Dealers tended to prefer to sell Barco because they received not only a higher price, but a higher percentage of that price. In general, however, dealers did a higher volume with Sony. In 1989, few dealers could survive without the Sony volume; an estimated 80% to 90% of professional audiovisual dealers worldwide carried Sony video equipment. Sony had a reputation for reliability and low price among dealers.

Sony Components and BPS   Sony entered industrial projection in 1985 with its 1020 video projector. Although the 1020 was slower than Barco's video projectors at that time, it had a sharper focus, indicating a better quality tube. Upon closer examination, BPS engineers found the tube, manufactured in-house at Sony Components (a Sony division), to be far superior in quality to Clinton's, BPS's U.S.-based supplier.

In late 1985, Frans Claerbout traveled to Japan to investigate buying from Sony Components. The division, which remained independent from Sony Projectors up to the chairman's level, agreed to supply Barco, and six months later the first Sony tube was introduced in the Barco Data 3 (BD3).

Measured by lumens, Barco was able to achieve better brightness with Sony's tube than Sony itself. Barco terminated its supply relationship with Clinton, and Sony became its sole supplier. Claerbout commented on the relationship:

> Our relationship with Sony is a strange one. We are competitors with Sony projectors yet we source from their in-house supplier. To obtain tubes that suit our needs, we share a certain amount of technical and developmental information with Sony Components, while they keep us abreast of their latest developments. The fact that we rely on them for an important component makes us vulnerable, but at the same time we think that they value our business because we bring their manufacturing costs down. I would say that over the course of our relationship, Sony Components has treated us fairly.

In one instance in 1987, however, Sony introduced a video projector with a tube that Barco had not seen; BPS subsequently purchased the tube, which appeared in its BD600.

By 1989, BPS was actively seeking other tube suppliers. All other tubes available on the market were either inferior to Sony's, more expensive, or both. Many firms manufactured tubes suited to consumer video applications, including Hitachi, Toshiba, Thomson, and Philips, but only the Sony tube had the quality necessary for high-end video projection. Sony, Barco, and Electrohome all sourced tubes from Sony Components. To protect itself against a sudden supply freeze, BPS kept a three-month supply of tubes in-house, and two months of orders in transit from Sony.

BPS spent 90 million-100 million Bfr ($2.25 million to $2.5 million) annually for approximately 20,000 Sony tubes, which represented around one-fifth of Sony Component's projector tube business. One tube cost between 5,000 Bfr ($125) and 18,000 Bfr ($450), depending on size and quality, and BPS negotiated continuously with Sony to get the prices down. Altogether, perhaps 35% of Sony Component's business was noncaptive. BPS's operations manager observed: "Any time Sony wanted to squeeze us out, they could raise the price of their tubes. We would be dead in the water six months before finding another source. But I don't think they will. When we discuss other suppliers, we are taken seriously." Erik Dejonghe agreed:

> Sony has told me that their ultimate goal is to be 50% an industrial supplier, and 50% a consumer supplier—not to beat Barco in projection. I am making a bet that they continue to supply us reliably. They need competition to survive, and we are the only competition with whom they make substantial money.

In February 1989, Sony Components contacted BPS about a new 8" tube it was developing. BPS received its first sample of the product in June, and its engineers were running tests on the product's performance capabilities. The face of the tube was square, rather than the conventional rectangular shape, and the product was significantly more costly than the 7" tubes BPS was currently sourcing from Sony. BPS engineers had considered incorporating the new tube in the BD700 data projector, but decided against the idea because to do so would involve redesigning the shape of the projector's chassis and sourcing a new lens to match.

Other Competitors

Electrohome   Electrohome was a privately held Canadian electronics manufacturer, with 1988 turnover of 5.6 billion Bfr ($139.8 million). Industrial projectors were the most successful group in its Electronics division, which had turnover of 2.5 billion Bfr ($62.5 million) in 1988. Electrohome operated in the data and graphics segments of the marketplace only, and was BPS's largest competitor in graphics. Electrohome was the third-largest player in unit sales behind Sony and

Barco, with 1,585 units sold in 1988. Its product mix was 73% data and 27% graphics. Worldwide, the company had an estimated 11% of total data units sold and 44% of graphics units.

Electrohome was estimated to have distribution strength comparable to BPS's, with nearly 100 dealers in the U.S. market; 80% of Electrohome's dealers were systems specialists. Given the intense competition between BPS and Electrohome in graphics, it was rare to find the two manufacturers' products sold by the same dealer. In general, Electrohome's products were priced just below BPS's. Together with BPS, it was viewed as having higher quality projectors than Sony.

NEC   A major Japanese electronics manufacturer with 1988 turnover of 876 billion Bfr ($21.9 billion), NEC sold video and data projectors, with a product mix divided 48% and 52% between the two. NEC had pioneered digital convergence technology in the marketplace, introducing a digital data projector in 1987 that became the market standard. The company had not captured as much market share as expected, however, in part due to its inefficient distribution network. Originally, NEC projectors had been sold through the company's well-established network of computer dealers. When sales proved disappointing, NEC granted an OEM agreement to the U.S.-based General Electric Corporation (GE). In 1988, the company sold 1,799 units through its own network and another 1,200 through GE. The company was estimated to hold 4% (units) of the video market worldwide and 9% of the data market.

The Sony 1270 Introduction

In August 1989, at the Siggraph trade show in Boston, Sony previewed a projector whose performance shocked Barco and the rest of the industry. Introduced as a "superdata" projector, Sony's new model—the 1270—had the power to scan to 75 kHz, placing it in the market for high-performance graphics applications that BPS could not enter. In addition, the 1270 featured the new 8" Sony tube, which gave it higher marks than the BG400 in brightness, image quality, and resolution. Price rumors at Siggraph, however, placed the unit in BPS's data range, at 600,000 Bfr to 800,000 Bfr ($15,000 to $20,000). If these rumors proved true, such performance had never been available on the market for such a low price. Erik Dejonghe, Bernard Dursin, and the U.S. regional marketing manager were the Barco representatives at Siggraph that afternoon. The regional manager described the scene:

> Sony had chosen the U.S. market for its kick-off preview. They had one pre-production unit set up in a very small booth, and their presentation was quite low-key. But the 1270 was a show-stealer. It was a magnificent product. I spent two days at the booth, in a crowd of people, trying to find out as much as I could.

Dejonghe and the others were not surprised as much by a Sony introduction as by the type of projector the 1270 turned out to be. There had been rumors, spread mostly by dealers, about an impending Sony introduction earlier in 1989. He explained:

> Barco had a pretty good idea that Sony was bringing out a new product, but we had expected it to be a direct competitor for the BD600. We thought it would be a 46-50 kHz machine, priced 10% to 15% lower than ours. In response, we planned to introduce a 64 kHz digital upgrade of the BD600 (the BD700) by October. We planned to maintain the 960,000 Bfr ($24,000) price tag on our BG400 until we introduced a digital version (the BG800) in late 1990. Then, we expected Sony to introduce a 75 kHz graphics projector in 1990, priced somewhere near 800,000 Bfr ($20,000). All our projections, however, were based on the assumption that

Sony would respect our "vision" of the marketplace. The 1270 did just the opposite. Its positioning threatened to take a great deal of money out of the industry.

Sony announced that it would roll out the 1270 in its major markets in November. The company planned the largest-ever publicity campaign in industrial projection history; for example, 15,000 customers, dealers, and distributors had been invited to the 1270's preview in France, and 5,000 to the preview in Belgium. BPS's regional marketing manager commented:

It is obvious that Sony is not interested in competing with Barco and Electrohome for a few hundred projectors per year in the graphics segment. Instead, their aim is to reconquer our data and graphics markets, and, to do so, they need to break their market image as a mass producer of low-end products.

Although the price reports on the projector could not be confirmed, confusion reigned in the marketplace. Dealers were panicked about the possibility of a low-priced graphics projector from Sony, while Barco distributors were anxious to know how Barco planned to react. In early September, in an effort to calm the market, Barco had spread the word that it did not believe the rumors about the low price of the 1270. Privately, however, BPS management was worried about the potential for significant erosion of its market share. On the plane ride home from the Siggraph show, Dejonghe calculated that BPS stood to lose as much as 75% of its forecast 1990 profits.

Saturday, September 23, 1989

As Saturday morning turned into afternoon, Dejonghe, Claerbout, and Dursin continued to weigh options. Mindful of what BPS risked losing, they had yet to reach agreement.

Pricing Options

Sony's 1270 targeted the U.S. and European markets—markets that represented 83% of BPS graphics revenues and 91% of its data revenues. In the month since, Siggraph, Dejonghe, Claerbout, and Dursin had given considerable thought to the potential impact of the 1270 for the rest of 1989 (October, November, and December) and 1990. By their estimations, if the BG400's price remained unchanged and the 1270 was priced at 800,000 Bfr ($20,000), the BG400 could lose 30% of its market share, or 153.8 million Bfr ($3.85 million).[4] At 600,000 Bfr ($15,000), the Sony 1270 threatened to capture 60% of the BG400's market share, or 307.5 million Bfr ($7.69 million). In addition, at this lower price point, Dejonghe and the others were concerned that the 1270 would cause significant share erosion of the BD600, priced at 480,000 ($12,000).

How should the BG400 and the BD600 be priced in response to the Sony 1270? For each machine, there were the questions of how much, if any, of a price change to implement, which markets to lower prices in, and over what time frame. Dursin reported that BPS's German distributor was feeling the pressure of the 1270 most severely, and had been calling for a significant price decrease since Siggraph. In early September, the president of the distributorship had declared:

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[4]BPS estimated that graphics sales for the last three months of 1989 would reach 106.7 million Bfr ($2.67 million), making the total for the year 426.8 million Bfr ($10.67 million). Assuming 25% growth for the following year, the 1990 graphics revenue estimate was 533.5 million Bfr ($13.34 million). The 15-month revenue estimate was thus 640.7 Bfr ($16.02 million), of which 80%, or 512.56 million Bfr ($12.8 million), could be assumed to be sales of the BG400. A 30% loss in sales of the BG400 would total 153.8 million Bfr ($3.85 million), while a 60% loss would total 307.5 million Bfr ($7.69 million).

Germany is the second-largest BG400 market in the world. Our dealers inform us that Sony is taking advance orders on its 1270 in Germany. We need to protect this market by dropping the price on the projectors drastically and immediately.

The French distributor, too, was experiencing market pressure to announce a price decrease on the BG400. In the U.S. market, however, the distributor was adamantly opposed to lowering the price. The BPS regional marketing manager described the reasoning behind this opposition:

It goes without saying that Barco cannot win a price war against Sony. Lowering our price might drive Sony to lower theirs further, and we could not follow. We might never be able to recover our price positioning on graphics machines. In addition, a drastic price drop would damage our reputation among recent, and hopefully repeat, BPS customers. Our only option is to develop a competitive projector.

Frans Claerbout was concerned about moving too quickly to lower the BG400 price—in markets where Sony was not coming out strongly, it would be the equivalent of giving away profit. He wanted to wait for confirmation of the Sony price before making any pricing decisions. In direct contrast, Dursin felt strongly that BPS should preempt the pricing of the 1270.

Product Development Options

The three men also had a series of product development options to consider in light of the 1270. Early in 1989, BPS's development plan had been sketched out according to expectations of increased competition in the data segment of the market. The plan called for the introduction of the digital BD700 by October, followed by the development of the digital BG800 for a late 1990 introduction. Twenty-seven person-months were required to complete the BD700 project, while 180 person-months had already gone into the project. In addition, BPS engineers were working concurrently on four other projector-related projects.

BPS could continue its development schedule as planned, introducing the **BD700** on time in October for immediate production and delivery. BPS's first digital model, the projector, also incorporated an improved generator and a scanning frequency of 64 kHz. BD700 sales in 1990 were expected to increase 25% in incremental sales over the forecast revenue of the BD600, representing some 171.7 million Bfr ($4.3 million)[5]. By September, BPS's German distributor and several others already had orders for the BD700, priced at 640,000 Bfr ($16,000), on their books. Claerbout understood how important it was to complete the BD700 project on time for both his engineers' and his customers' morale. At the same time, the BD700 would not beat the 1270's performance at the Infocomm show in January 1990.

Alternatively, BPS could use the advances made in the BD700 development as a springboard to a digital graphics projector, the **BG700**. Dejonghe estimated that BPS engineers could develop a graphics version in two to three months, working from the BD700's chassis, tubes, and lenses, with the sole addition of higher scanning frequency to match that of the 1270. If this option were pursued, the introduction of the BD700 would need to be postponed until December, causing delay in its delivery to advance-order customers. Also, with BPS's standard 7" tube, the digital graphics projector would still be inferior to the 1270 in terms of light output, picture quality, and resolution.

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[5]Data revenues were predicted to reach 912.7 million Bfr ($22.8 million) in 1989, and, assuming 12.3% growth for the next year, 1,025 million Bfr ($25.6 million) in 1990. Sixty-seven percent or 686.8 million Bfr ($17.2 million) in 1990, could be assumed to be sales of the BD600. The BD700 was expected to increase data sales 25% over the BD600, representing 171.7 million Bfr ($4.3 million).

BPS's third option was to turn immediately to the development of the **BG800**. As originally planned, it was to be a digital upgrade of the BG400. Faced with the threat from Sony, however, the BG800 now had to be designed to surpass the 1270's performance. This would require a scanning frequency well above that of the 1270's—at least 90 kHz—as well as the incorporation of the Sony 8″ tube for the best possible performance. Dejonghe had received confirmation from Sony Components that it could begin supplying the tube immediately. The 8″ tube required a special lens, however, and BPS's traditional lens supplier, U.S. Precision Lens of Cincinnati (USPL), had no compatible product. Although in the past Barco and Sony sourced lenses from the same supplier, Sony worked with a Japanese firm, Fujinon, to develop the lens in the 1270. Dejonghe was not sure that Fujinon would supply Barco as well.

Claerbout estimated that developing the BG800 with at least 90 kHz of scanning frequency and new tubes would require at least 80 person-months. In addition, he felt strongly that the projector would have to be ready in time for Infocomm if it was to be effective against the 1270. Meeting that deadline would require stopping all other BPS development projects from October 1 on, including the BD700. He voiced a number of concerns about such a drastic move:

> My engineers have been working overtime on the development of the BD700 since mid-summer. Now, we're considering move that would require the indefinite postponement of the BD700 project, and an even greater commitment on their part. Overtime would be a given, but they'd also need to give up vacation days until Infocomm at least. We have the capability to produce a great machine, one that is superior to the 1270. But the compression of its development could have repercussions on the quality of the final product. In addition, we don't know yet when the 1270 will actually hit the marketplace, how it will be priced, or how the customers will respond to it.

In addition to these considerations, Claerbout gave the BG800 only a 40% chance of making the Infocomm deadline.

Exhibit 1   Key BPS Financial Data, 1988-1989 (in millions of Bfr)

	1988 (Bfr)	$U.S.	1989E (Bfr)	$U.S.
Turnover[a]	1,387	34.7	1,983	49.6
Direct production costs	772	19.3	815	20.4
Total production overhead	40	1.0	45	1.1
Marketing and R&D	130	3.3	170	4.3
Depreciation and charges	138	3.5	329	8.2
Income before taxes	307	7.7	624	15.6

Source: BPS

[a]In addition to sales of video, data, and graphics projectors, BPS turnover recorded sales of projector accessories. In 1988, this category amounted to 168.5 million Bfr ($4.2 million); in 1989 it was 239.3 million Bfr ($6 million)

Exhibit 2   The Management of Barco Projection Systems, 1989

CEO Barco Group **Hugo Vandamme**	
COO Barco Group **Erik Dejonghe**	

General Manager
BPS
Frans Claerbout

General Manager
BPS International
Bernard Dursin

Five other
Barco
divisions

Product Development
Manager

- Electronic Division
- Mechanical/Optical Division
- Technical Product Documentation
  - User Manual
  - Service Manual

Operations
Manager

- Planning
- Purchasing
- Production
- Quality

Marketing and Sales
3 Regional
Marketing Managers

Region 1
Belgium, France, United Kingdom, Africa

Region 2
Germany, Eastern Europe, Far East

Region 3
United States, Canada, Scandanavia, Latin America, Middle East

Barco Belgium

Barco France
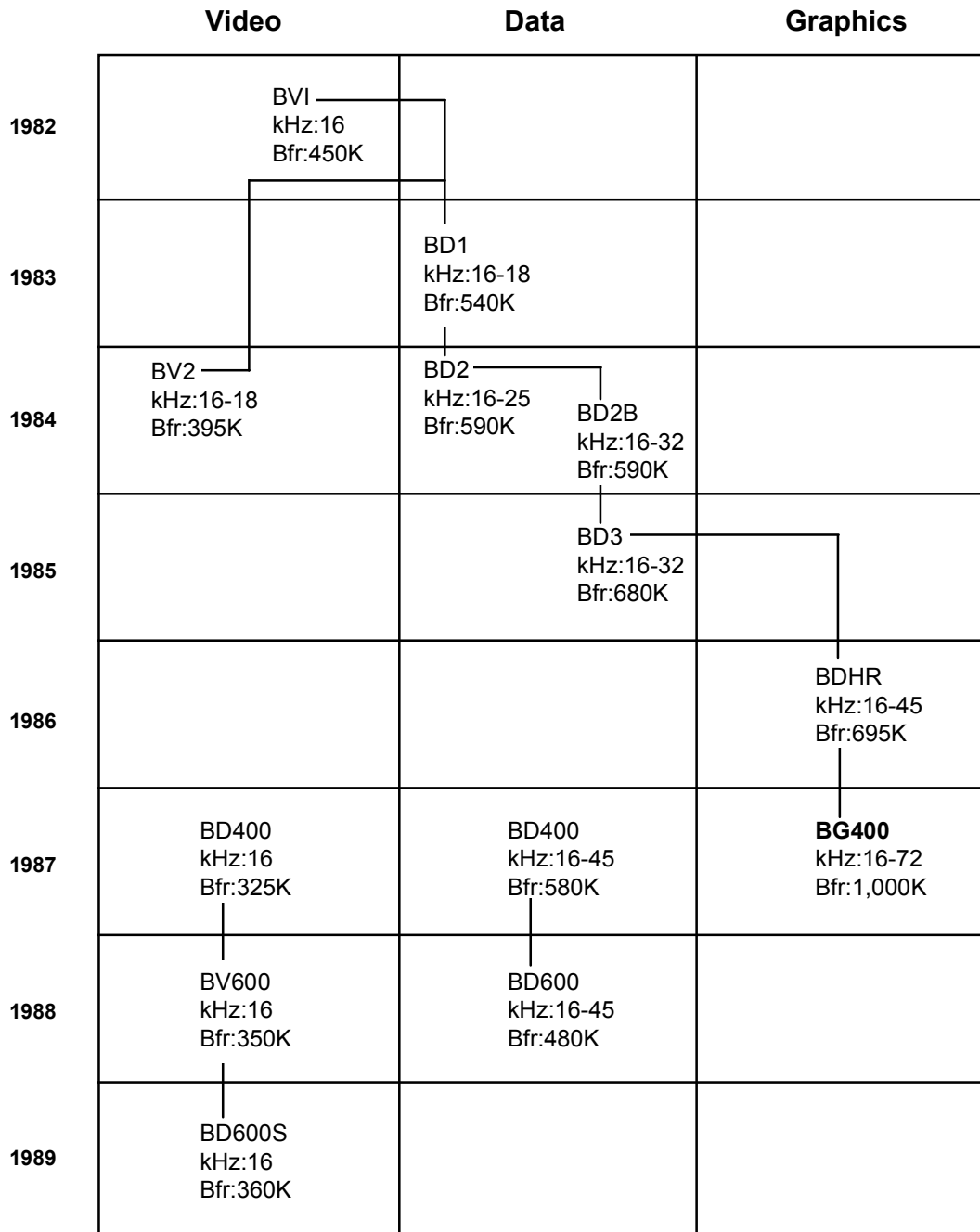
Barco U.K.

TVD Germany

Barco, U.S.A.

Note: Non-wholly-owned distributors not shown here reported jointly to Barco International and the appropriate regional marketing manager.

Exhibit 3   Projector Diagram

Projector Side View

Projector Top View
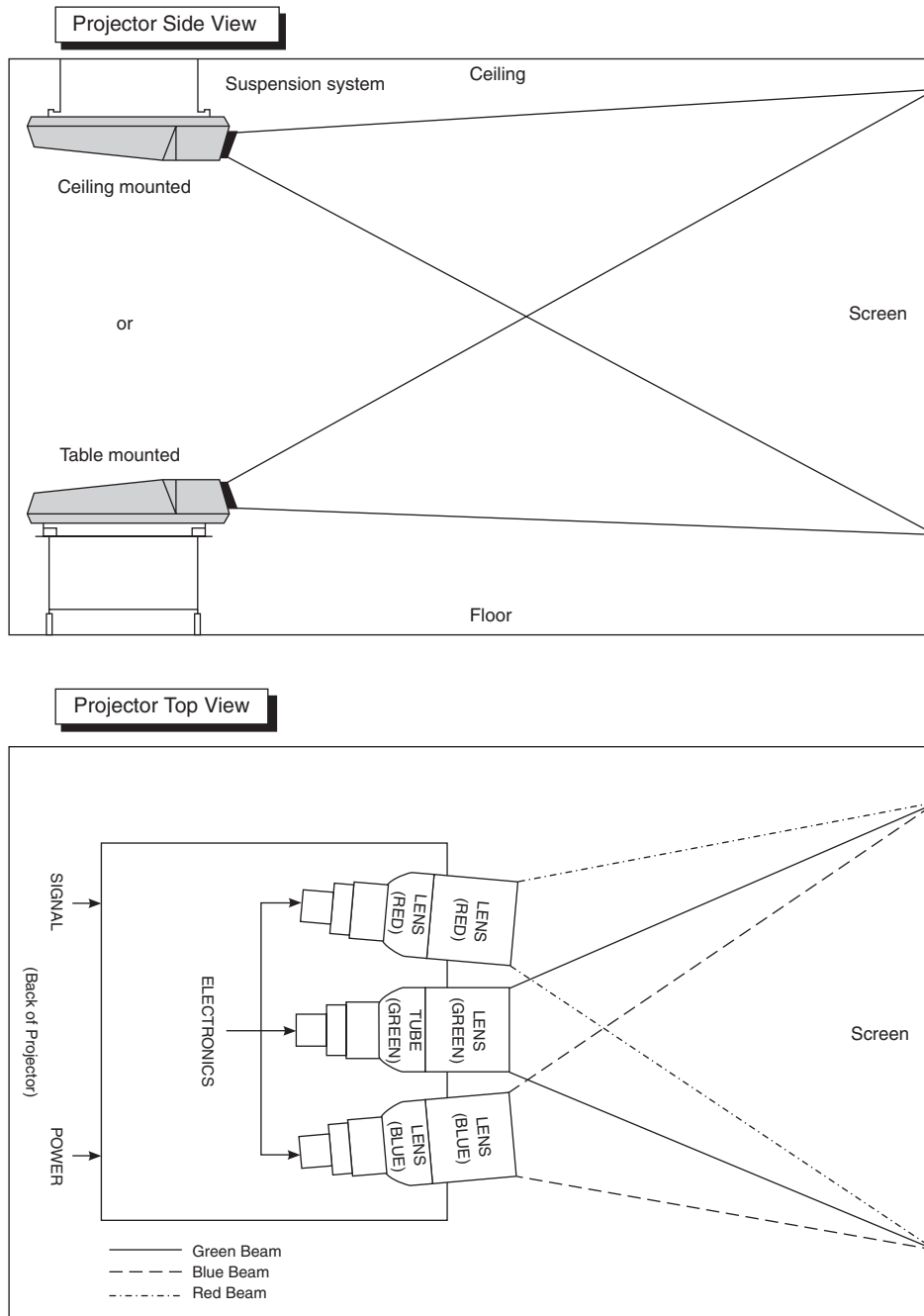
Note: A projector functioned in three stages. First, the information contained in an electronic signal was split into its color (red, green, blue) content. Then, each color's information was redrawn by the electrons of the projector's tubes, one for each color. Finally, the three resulting images were passed through magnifying lenses and projected in sync onto the screen for a full-color image.

Exhibit 4   BPS Product Evolution, 1982-1989

	Video	Data	Graphics
1982	BVI kHz:16 Bfr:450K		
1983		BD1 kHz:16-18 Bfr:540K	
1984	BV2 kHz:16-18 Bfr:395K	BD2 kHz:16-25 Bfr:590K BD2B kHz:16-32 Bfr:590K	
1985		BD3 kHz:16-32 Bfr:680K	
1986			BDHR kHz:16-45 Bfr:695K
1987	BD400 kHz:16 Bfr:325K	BD400 kHz:16-45 Bfr:580K	**BG400** kHz:16-72 Bfr:1,000K
1988	BV600 kHz:16 Bfr:350K	BD600 kHz:16-45 Bfr:480K	
1989	BD600S kHz:16 Bfr:360K		

Source: BPS

Note: This diagram contains principal 7# projector introductions only; modifications and special-application projectors are not included.

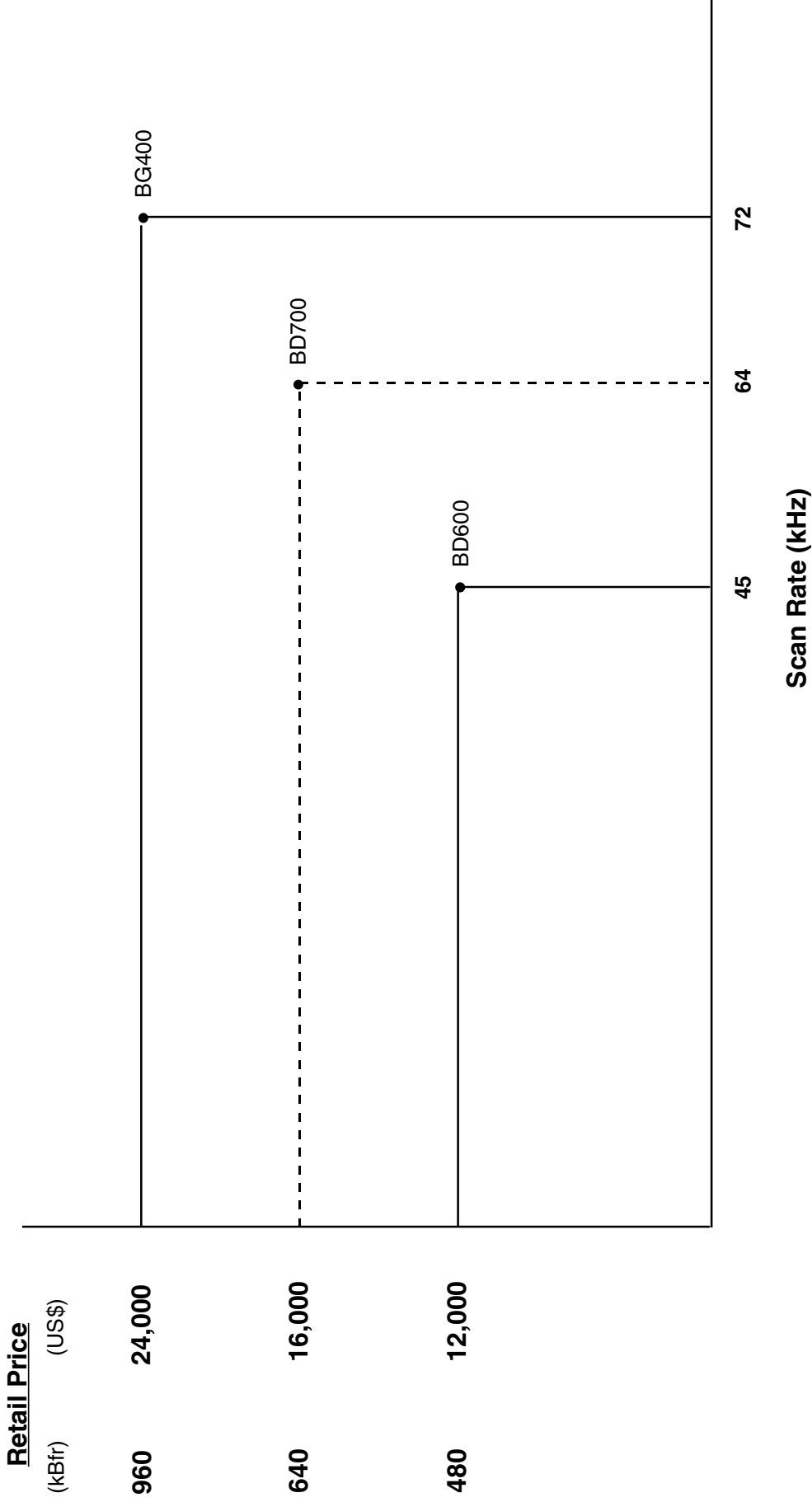**Exhibit 5**   Barco's Product Positioning, August 1989 (pre-Siggraph)

Retail Price

(kBfr)   (US$)

960   **24,000**   ● BG400

640   **16,000**   ● BD700

480   **12,000**   ● BD600

45   64   72

Scan Rate (kHz)

Exhibit 6   Products of the Major Manufacturers, August 1989

| Manufacturer | Model | Scan Rate (kHz) | Light Output (lumens) | Resolution (# lines) | Retail Price | |
					(Bfr)	(US$)
Barco	BD600	16-45	600	1,600	480,000	12,000
	BG400	16-72	400	2,000	960,000	24,000
Sony	VPH1031	16-35	300	1,100	420,000	10,500
Electrohome	ECP2000	16-36	400	1,280	344,000	8,600
	ECP3000	16-50	650	1,280	580,000	14,500
	ECP4000	16-70	650	1,280	960,000	24,000
NEC	DP1200	16-35	475	800	420,000	10,500
	GP3000	16-54	600	1,100	640,000	16,000

Source: BPS

Note: Light output and resolution were used in addition to scan rate to measure a projector's performance on the world marketplace. Brightness increased with the number of lumens; however, the human eye could discern only large increases. For example, the eye perceived a 1,000 lumen projector as 50% brighter than a 100 lumen projector. With resolution, the larger the number of lines, the better the quality of our final image. Barco believed that its projectors had the highest light output of all the competitors; however, due to differences in the standards used to calculate lumens, light output was difficult to compare between companies.