

Bose Corporation

Hi-Fi Leader Stretches to Meet Growth Challenges

Patricia E. Moody

Tough customers, those JIT automakers, looking for deliveries within a one-hour window. But Bose Corporation, the Massachusetts-based global supplier of consumer electronics, is meeting the challenge.

How does Bose keep customers like Honda and Nissan in Japan, Mercedes and GM in the United States happy? According to company President Sherwin Greenblatt, there are lots of paths to success. What he gives employees is "a framework of freedom." That means getting good people and paying them well, but mostly giving them the opportunity, within business-driven parameters, to be creative.

Creativity at Work

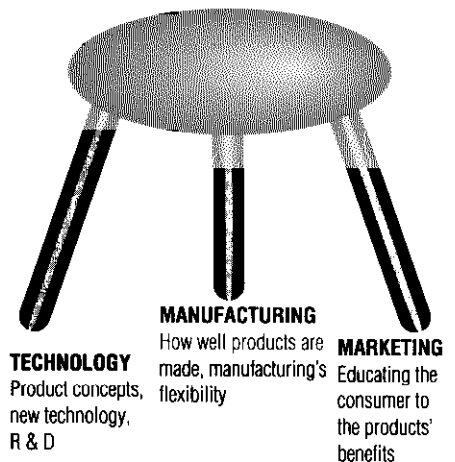
Bose Corporation, the brainchild of MIT-professor Dr. Amar Bose, was founded in 1964 in Natick, MA. Year one, Mr. Greenblatt, Bose's first and *only* employee, swept floors, answered phones, prepared proposals for government electronics contracts, and did R&D. Year two, the company started to build product.

According to Mr. Greenblatt, the company has been "lucky" to pioneer technology applications for new products. Their 901 speaker in 1968 led the way for small, true high-fidelity speakers. Recently, the auto sound system market has opened up new market segments. Other acoustics applications await — noise-canceling headsets, and industrial uses, for example.

Says Mr. Greenblatt, in good times

and bad times, there are always people wanting quality products. If you have them, your business will survive better than if you simply compete on lowest cost.

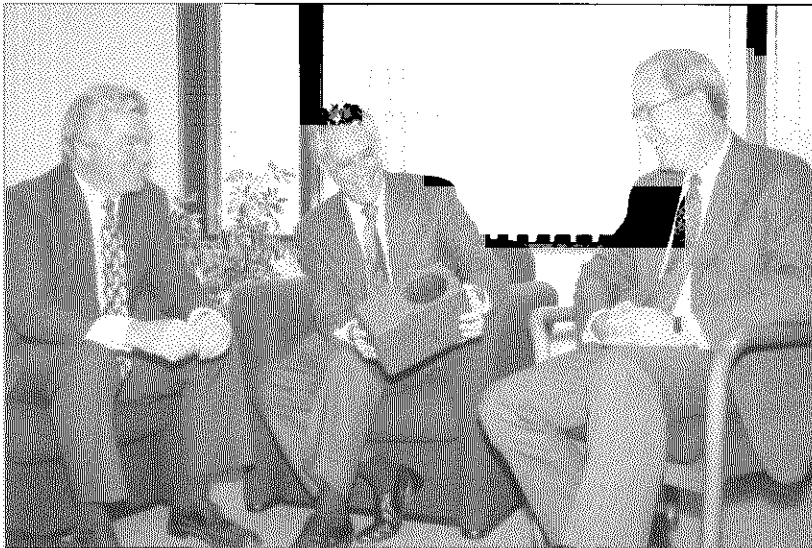
Bose's strategy has been to combine technology with creative people to develop products that offer high performance, and are simple to use, yet sophisticated. To compete successfully against other companies ten or twenty times larger, Bose must be "on a balanced base."



Each of three legs — technology, manufacturing, marketing — must grow equally as the company grows. If one leg is shorter or weaker than the others, the company collapses.

About Bose

Revenues	\$400 million, one-third to Japan
Growth rate	25% per yr, compounded
Founded	1964, privately held
No. of plants	6
No. of employees	3000 worldwide, 850 Framingham, MA
No. of suppliers	450
No. of parts	5000



Lance Dixon, Sherwin Greenblatt, and Tom Beeson.

Technology

When the industry was moving toward bigger and bigger speakers, non-expert customers asked, "Why do we have to have speakers that take over our living room?" Technology provided the answer. The company will continue to look to engineering to advance product and process technologies.

Manufacturing

Tom Beeson, Bose's vice president of manufacturing, names three achievements he is most proud of — success in the OEM automobile business satisfying Japanese customers, Bose's ability to satisfy demands of the component audio business, and electronics automation and integration.

Three years ago the manufacturing leg had great difficulty keeping up with very cyclical component audio demand. Parts came from diverse locations — Framingham, Mexico, the Far East. How has the company compensated for seasonality? According to Tom Beeson, by getting better at anticipation, and by becoming more flexible, which is where purchasing's JIT II®¹ comes in.

JIT II®

Bose's innovative procurement concept, an area within manufacturing's domain, drives its very competitive approach to sourcing in world markets. Lance Dixon, Bose's director of purchasing and logistics, has reached agreements with seven — plastics, printing, metal, transportation, packaging, resin, and customs brokerage — suppliers to locate their representatives in-house.

Called "In-plants," these supplier personnel replace both the buyer and the salesman. Salaries

are paid by the supplier, but the in-plant wears a Bose badge, and has complete access to the company, from engineering meetings, to the purchase order system, even to the receiving docks. The In-plant places orders on himself. What are the benefits of this scheme?

- The In-plant has access to new product design programs and can, with his expertise, influence the design process.
- Bose offers its suppliers an added incentive to discover product/process improvements. Through value analysis on the existing product base, the supplier keeps one-half of the savings on cost reductions they create — forever. When one supplier, for example, recommended that Bose change a speaker grill from aluminum to steel, thereby changing the finishing material as well, the cost dropped 20 percent, ten percent of which went to the supplier.
- Bose's vendor engineering function resides in the procurement organization, so purchasing can assist suppliers, helping G+F Industries, for example, reach very high quality levels in plastic injection molding, through better process control.
- When Bose introduces new products in Massachusetts, prototypes developed in Boston eventually move on to a satellite plant. Typically, the satellite start-up may bring in new suppliers at the bottom of the learning curve. With JIT II, some In-plants travel to the satellite to assist.

G & F Industry's Chris LaBonte, for example, is helping Bose's Arizona operation to get going on new products that have already been produced in Massachusetts. Being in on both start-ups eliminates frantic "your parts don't work" phone calls, because LaBonte has identified problems to the plant in advance.

At the suggestion of Bose management, G & F purchased a new plant in Ireland, located close to the customer's new facility, offering both companies better access to the Common Market. G & F can move a proven tool supporting Massachusetts production to the Irish plant, thereby accelerating the start-up.

Although the initial focus started with supplier reps, the company now sends engineers out to

its partners. Steve Parker, whose regular assignment is plastic tooling procurement, spent three months with Bose's plastics supplier. His assignment? To review each part for process and design opportunities, tooling, and equipment selection.

JIT II® Logistics

Paul Tagliamonte, a young, intense hire out of P.I.E., is credited with the design and implementation of Bose's supercharged on-line, realtime transportation system. Imagine the power of being able to tell internal and external customers not just, "it's been shipped, you should be seeing it in three or four days," but "it's in the Newark terminal, scheduled to go out at 1 pm, you will see it by 5 pm!"

Or for overseas shipments, for those of you who have ever attempted to expedite U.S. customs, Paul has created paperless processing and constant monitoring of material whereabouts. In fact, W. N. Proctor, Bose's customs broker, ties into shipping systems directly, and files clearance documentation *in advance* of material movement. That means that as they monitor worldwide freight movements, they can move material away from known bottlenecks, into easier processing points.

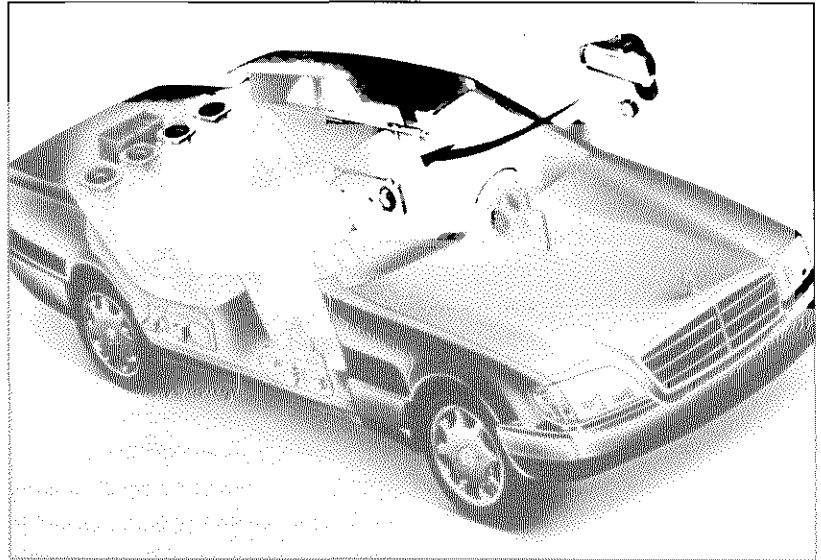
Finally, picture a room filled with rows of gray decks replaced by one computer that performs on-line match-ups for all waybills and invoices; funds authorization and transfer is handled electronically by Bose through its Bank of Boston account.

A Parable of Growth, The Value of Making it Yourself

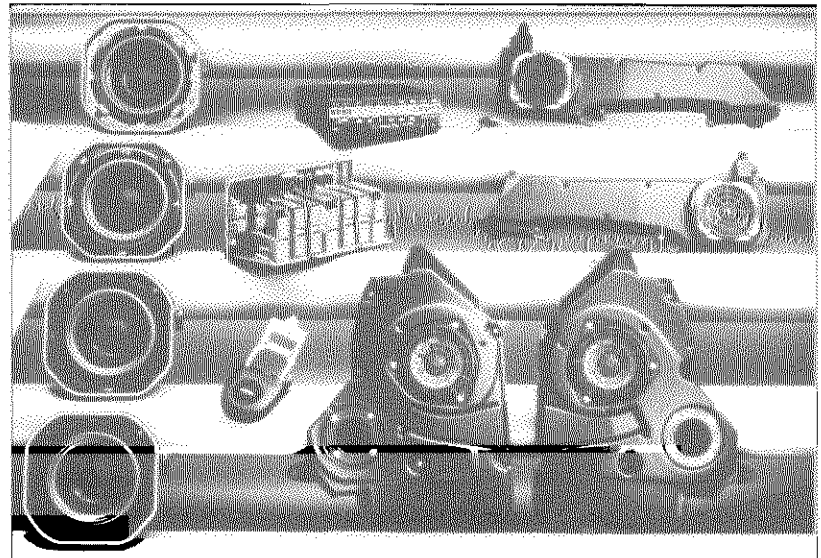
Mr. Greenblatt believes that to be a strong player in the world market, the company must make the things it sells, because it's through making product that a company comes up with improvement ideas. "The computer guys aren't doing that, but they're wrong. We have seen that in our industry."

He points to H-P as an example of a computer manufacturer that still makes its own product, stating that the companies that have given up on manufacturing in the long run are going to lose — 15-20 years from now they will be owned by their suppliers.. And the companies that manufacture well are the ones who control the market at the end.

Of course there are cycles — in the beginning



Schematic diagram of the Bose Beta Music System illustrating acoustic placements throughout the car.



Components of the 1992 model year Mercedes Benz S Class Sedan incorporating acoustic enclosures, electronic amplifier module, and Becker receiver/tape deck.

all hi-fi producers were small. Off shore companies offered to help — "Hey, we can't invent your product, but we could probably make it for you for less, so let us manufacture for you."

As time went on, the offshore organization gained more expertise, first designing the mundane parts of the product — "We'll do the mechanical design, you give us the idea of how it should look, what the circuits should be like, and we'll design the product for you."

Then they offered, "You tell us what it should look like, but we're working with our suppliers on circuitry, so we can design circuits for you if you just give us the idea; you do the marketing and selling." Bingo, little by little the design areas

went to manufacturing, with U.S. companies left to do marketing.

But when times got bad, as they always do, the marketing companies went to the manufacturers for financing. So the manufacturers began to finance the marketers. Then they were gone.

The president feels that Bose is far enough into manufacturing its own products to know that it's not impossible. "The more we make ourselves, the better the designs, and the better we get at making them. Plus the designs we do are better suited to our business than what the offshore suppliers would do."

Good Customers Good Suppliers Make

Tom Beeson credits Bose's Japanese customers with tremendous volume and quality increases for Bose. Three years ago, when Bose started to supply Nissan and Honda in Japan, rejects averaged 2000 parts per million, against a customer demand for 300; the current level is 200.

The transformation involved every aspect of the operation — product design, the process, systems, people training, inventory control — what Tom calls "major surgery and reconstruction."

According to Mr. Beeson, the older systems were not friendly to automated assembly, and difficult to assemble, possibly because previous experience with customers like GM was limited to small quantities for individual models. Nissan requires higher volumes of standardized items; what had formerly been designed to be very specific, had to be ready in large numbers.

The automotive products are custom music systems, each one specific to the car model, equalized for its individual listening environment. The car's geometry changes the music components — with any particular manufacturer there may be 12 models, and numerous variations. One customer may require a hundred iterations. Nissan's ZX has two different equalizations, one for the two seater and one for the two plus two.

Bose has implemented MRPII using ManMan simultaneously in two factories; three of six factories have been certified Class A so far.

Wood manufacturing for speaker cabinets is another example of the company's flexibility. Machining a lot of wood complete, through four or

five pieces of equipment — lamination, cutting, and machining different geometries — used to take three to four weeks. With numerically controlled routers, the Canadian plant has reduced leadtimes to two to three days.

Reliability is becoming more important as people expect products to work longer, problem-free. President Greenblatt sees Bose manufacturing getting stronger and stronger as the company produces more of its own products.

Gone is the hand-assembly operation at Bose's Hopkinton, MA facility, replaced with its Westboro high-tech factory; gone with it are the inevitable high reject rates, too.

Other improvements within manufacturing are more people-oriented, such as Team Bose, a unique program that uses a team approach to decision-making. Bose's successful pay for knowledge program takes manufacturing hires with basic qualifications and encourages them to broaden their production capabilities by taking courses like soldering, or SPC, with salary increases for each completed session.

Production is organized into two focus factories for the transducer and final product assemblies of "Japanese" systems and component hi-fi. Says Rusty West, plant manager at the Westboro facility, "This approach smooths customer satisfaction; results include 100 percent on-time deliveries, measured by the customer to the day, in the car audio sector, and 98 percent in component audio."

Nissan's process audit of the production line, previously conducted three times per year, now happens once. Mr. West plans to continue integrated automation efforts, looking to complete the automotive amplifier printed circuit assembly this year. Assembly through test should be 30 minutes plus four hour burn-in, with reduced labor, higher quality, shorter cycle times, and increased flexibility.

Pay as You Grow

What was the impetus for Bose's cost-saving approach to the increased demands on purchasing? According to Mr. Greenblatt, the popular belief was that the more purchasing personnel were in place, the more attention paid to each part, the

more money saved. But that growth pattern violated Dr. Bose's very tight financial parameters — don't bring in the bankers, stay privately held, and fund growth through profits.

Dr. Bose's founding philosophy — hire good people in every position, and give them freedom to grow themselves and the company — has been challenged by the need for cash to feed growth. But in the mid-sixties, management reached a decision point. The banks warned Dr. Bose that as his enterprise became successful, they would need to go the well, *their* well, and "we can help you with your public offerings."

But, says Greenblatt, they discovered that going public, and losing control, was not inevitable. "We did some modeling — Dr. Bose and I are engineers — modeling how the company works. We found that any given amount of growth we could finance ourselves if we were profitable at a certain level. Not surprising if you went to business school, but it was a revelation for us."

So the company leverages off people, rather than the banks. That means only doing things that lead to profitability; never spending more than they have. "Pay as you grow" has become part of the Bose culture; when the company evaluates ideas, they must be ideas that can be profitable. According to Mr. Greenblatt, "We teach people to be frugal, because otherwise they won't be able to realize their career dreams."

The president's limit on indirect costs meant a cap on purchasing hires. Mr. Dixon's ingenious response, JIT II,[®] solved one growth problem and has brought the company unexpected benefits from partnering with suppliers to solve process and design challenges.

The Next Generation

The company is too big to offer Mr. Greenblatt the opportunity to meet with each new employee as he once did. And yet his role as keeper of the philosophy requires him to find new ways to "re-mind the new folks, and sometimes the old ones," what the company stands for, and how to grow it.

Every quarter, the president meets in the Framingham facility with as many of the new people, three to nine month hires, as can be assembled, for an afternoon. The company story —

the founding, its struggles, and new challenges, makes up part of the session; the remainder is left open for any and all questions.

Sometimes as organizations grow, people stop thinking of another division as part of "their" corporation; the synergy of good ideas and the benefits of common thinking get lost. The OEM division, and the component audio division, for example, sell to very different customers — OEM to Nissan in Japan, and audio to major retail chains.

But for Bose to continue to grow at its 25 percent per year compounded rate, bridging and teamwork across the corporation will be crucial. They are experimenting with video as a communications vehicle inside the company. The company has started running intramural seminars focused on a specific community of interest — conferences for Bose purchasing people, at all factories, for example, and logistics, two operating areas which they have pioneered.

President Greenblatt cites other challenges for the future — multi-level forecasting, for one. The chain of big retailers, with their warehouses, and Bose as the supplier, with its warehouses, makes for an expensive guessing game.

"Seems like we all ought to be getting together" isn't too far off; if the retailers and Bose collaborate, they might be able to cut out one level, and reduce inventory for their mutual benefit. Supply chain simplification requires information sharing and joint planning. Greenblatt sees supply-chain simplification through information sharing and joint planning in the company's future.

Manufacturing challenges abound — more MRPII, more automation, more people projects. The manufacturing strategy, what Tom Besson calls "the McDonald's approach to manufacturing," is to build a system of self-sustaining, free-standing, locally sourced plants around the world, to grow the company's own manufacturing capabilities.

Says President Greenblatt, "You can't excel if you're in the middle — it's the people at the edges who are leaders." He sees Bose's growth in new technologies, and better and bigger manufacturing, as an extension of the MIT philosophy of always looking at the edges, new opportunities.

"It's the scientific method — like modeling.



Christine Mirgon, In-Plant Representative of Roadway Express Inc. and Mark Finnerty, In-Plant Representative of W. N. Proctor, whose tracking system provides online real-time information on import shipments.

In the business world people wander randomly around hoping to find something better — the antithesis of what I was taught at MIT. In engineering areas it's easy to go about change in an orderly scientific way, even in marketing and selling."

The whole concept of high performance sound systems delivered by auto manufacturers is still in its infancy — fewer than one percent of all cars delivered in the world have Bose systems. The president will be happy "when every person in the world is listening to their sound on a Bose product."

JIT II® is a registered service mark of Bose Corporation.

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