Report from Tokyo

While visiting the Tokyo Motor Show last October 22, 23 and 24, we had a chance to talk to many representatives from carmakers and suppliers at their booths. We were also fortunate to be able to meet privately with the top electrical engineers from Toyota, Nissan and Honda. At each session, our hosts generously shared their insights into automotive electronics in Japan, especially what technologies, trends and features we should be watching. In many respects, given the technological and market leadership and profitability of Japan’s big-three carmakers, what is happening in Japan will strongly influence what will happen in the rest of the world.

Pre-Crash Sensing

According to the Institute for Traffic Accident Research and Data Analysis in Japan, 66% of automobile accidents and injuries in Japan result from rear-end collisions, which are caused by a combination of delayed recognition and delayed response. With high safety standards in mind, each of the Japanese big-three has recently brought to market new products based on pre-crash obstacle detection sensors tied to alarms, motorized seatbelts and automatic braking. Selling radar to warn and protect drivers from the full impact of collisions with vehicles ahead would raise red flags in the United States, where carmakers are keen to avoid safety claims that could lead to litigation should the feature fail to work as advertised.

A valuable in Japan on the 2003 Harrier (Lexus RX300) and Celsior (Lexus LS430), Toyota’s pre-crash safety system employs a millimeter-wave radar sensor to detect obstacles ahead of the vehicle. When the system determines that a crash is unavoidable, a buzzer is sounded and the brakes are actuated to reduce impact speed, regardless of the driver’s operation of the brakes, and the motorized seatbelts automatically tighten to restrain the vehicle occupants. Upon any sudden braking by the driver, the seatbelts are automatically tightened and the brake booster is activated. Toyota has so far produced about 1,000 vehicles with factory-installed pre-crash systems.

Honda has also developed what it calls a collision mitigation system around the mean T-meter-wave radar sensors “that help assess the risk of collision and reduce harm in the event of a crash.” Since June 2003 when the 2003 Honda Inspire was launched in Japan, Honda has produced a total of about 1,500 such systems. Honda’s system warns of an impending crash by means of a visual display, audible alarm and tactile warning as the seatbelt pretensions and light braking is actuated. If the driver takes no action, the system automatically operates the brakes. While today the feature is an expensive option, collision mitigation systems are likely to become standard on some of Honda’s highest-priced vehicles.

In the summer of 2003, Nissan installed its Intelligent Brake Assist and Brake Operated Pre-Crash seatbelts on its new Cima (Infiniti Q45). Nissan’s system is similar to Honda’s and Toyota’s except that rather than a millimeter-wave radar sensor, the Nissan system employs a laser sensor based on infrared light.

International Standards

While the German carmakers Volkswagen, Mercedes-Benz and BMW have led the world to a number of standards, for example, the OSEK operating system, CAN, MOST and FlexRay networking protocols, top electrical engineers from Nissan, Honda and Toyota tell us that Japan doesn’t stand idly by while the world’s automotive electronics standards are created. “There are two kinds of standards,” said Nissan’s top electrical engineer, Masaharu Asono. “One is safety...”
or customer related like HMI [human machine interface]. I think Japan is leading standards in the navigation systems area, such as for viewing angle or how to measure driver distraction. But when it comes to standards used to buy parts at a lower cost, I think the Germans are ahead. Those carmakers depend on Bosch and a very small number of other suppliers, so they need to cooperate to make sure they don’t ask different things of the same suppliers.”

Toyota’s top electrical engineer, Hironobu Ono, a managing officer of the company, told us that Toyota is not just sitting back on standards. “We look at all that is available and decide what is appropriate to the current situation. For example, if MOST or the other standards meet the needs of Toyota and perform well, then Toyota will use them as appropriate.”

Regarding the German-inspired MOST protocol, Toyota has taken the lead in coming up with a standard alternative to MOST on fiber-optic cable by forming a working group to develop an electrical physical layer for MOST. Mr. Ono explained, “Having considered the benefits of fiber optics and the need for speed versus reliable hardware … using an electrical physical layer makes more sense at this time.” If MOST can reliably and inexpensively be applied to unshielded twisted pair network wiring, then Nissan, Honda and Toyota will almost certainly use the protocol.

Honda, Toyota and Nissan are already considering AUTOSAR, the standard most recently proposed by the Germans. AUTOSAR is a vehicle-wide software architecture concept intended to facilitate the reuse of software and simplify integration among networked electronic control units. While there is much work to be done to bring AUTOSAR beyond the concept stage, Nissan’s Mr. A samo told us that Nissan intends to join the partnership. Honda’s top electrical engineer Hiroki Iino said that since Honda builds vehicles in Europe, it would like to conform to standards such as AUTOSAR.

Bluetooth, used to wirelessly link the cell phone to the vehicle, is another example of where the Japanese have been proactive. Toyota’s Mr. Ono explained, “We wanted a standard protocol for Bluetooth hands-free phones. Although there were several groups working to finalize this communications protocol as an automotive standard, progress was very slow in achieving secure interoperability.” So Toyota formed a special working group comprised of Denso, NTT DoCoMo, Panasonic, Nissan and Toshiba and specified implementation guidelines for an automotive protocol that could be used worldwide. Not part of the Japanese working group, Honda will use a Bluetooth solution supplied by Johnson Controls for a hands-free cell phone feature on the 2004 Acura TL sold in the United States.

Mr. Ono also pointed out that Toyota took the lead to help the Kiwi-W consortium come up with a standard Japanese map data format for map discs. According to the Kiwi-W Web site, the data storage format suggested by Japan was argued before the ISO TC 204/WG 3 and is being deliberated as a “most likely candidate” to become a global standard. However, according to Navigation Technologies co-founder, Russ Shields, none of the European suppliers including Harman Becker, Siemens VDO and Bosch are using Kiwi in their navigation units. “While the Germans have not yet begun to push a global standard, there is an informal effort led by a Mercedes engineer to try and figure out what to do,” he said.

Traffic Information from VICS and Vehicle Probes

A ready on sale in Japan as a factory option on Honda’s new Civic, Odyssey minivan, Stream, CR-V and Fit is the world’s first DVD navigation/telematics unit that turns the vehicle into a traffic probe. Sensors aboard the vehicle keep track of the vehicle speed and location, and that data is transmitted in real time to the Honda InterNav call center. More than a year from now, once enough vehicles are equipped as traffic probes—possibly 1% to 2% of the vehicles currently on the road—the InterNav “floating car data” service will be able to calculate the average time it takes to drive from one location to another. That information will be integrated with and complement information from Japan’s VICS (Vehicle Information and Communications Systems) traffic information service.

Since VICS operations began nearly eight years ago, some seven million customers have purchased VICS receivers, which pick up transmissions from infrared and radio beacons as well as from FM radio broadcasts. A bout 700,000 VICS receivers are currently purchased each year. VICS information can be displayed on any compatible navigation unit. Road segments where traffic is moving under 10 kilometers per hour appear in red on the display; orange indicates 10 to 20 km/h and green is normal flow.

While VICS traffic information is free, “VICS doesn’t cover all roads in Japan, and it doesn’t provide link travel times needed to make a travel recommendation,” said Takao A sami, in charge of intelligent transportation systems at Nissan. Mr. A sami told us that Nissan and other Japanese carmakers are also developing the means to collect traffic information from probes.

Japanese Consumers Ignore Clarion’s AutoPC

Clarion was the world’s first and only supplier to introduce the AutoPC to the U.S. aftermarket, in 1998. Based on continued on following page

Traffic Information from VICS and Vehicle Probes

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Microsoft's Windows CE for Automotive software platform, the AutoPC is a general purpose, multimedia, telematics computing platform. By January 2001, less than five thousand units had been sold. Not ready to abandon the idea of bringing e-mail and the Internet to the vehicle, Clarion in mid-2001 launched the AutoPC in the Japanese aftermarket, but the product is doing poorly in Japan as well. For the first eight months of 2003, only 800 AutoPCs were sold in Japan. Why were so few AutoPCs sold in gadget-loving Japan? One Clarion booth representative suggested that its high price is a factor: ¥320,000 ($2,941) for the AutoPC, including navigation, compared with ¥220,000 ($2,022) for a typical navigation system. And the AutoPC's display is smaller than most navigation displays. Toyota's Mr. Ono explained another problem with the AutoPC, "Internet in the car is not really an appropriate application at this time."

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<table>
<thead>
<tr>
<th>System</th>
<th>Features</th>
<th>Introduced</th>
<th>No. of Models Equipped</th>
<th>Production Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cornering Assist Monitor</td>
<td>Camera displays front side field of view.</td>
<td>1997 Crown (Japan) 2001 Ipsum* (Japan)</td>
<td>9</td>
<td>200,000/year, estimated</td>
</tr>
<tr>
<td>Intelligent Parking Assist</td>
<td>Parallel and backward parking trajectory is calculated; computer controls steering.</td>
<td>2003 Prius* (Japan)</td>
<td>1</td>
<td>80% of Prius production</td>
</tr>
<tr>
<td>Adaptive Cruise Control</td>
<td>Laser radar (LIDAR) or millimeter-wave radar detects distance to vehicle ahead. Controls brake and throttle.</td>
<td>1997 Celsior (Japan) LIDAR 2000 LS430 (U.S.) LIDAR 2003 Celsior (Japan) Millimeter wave</td>
<td>8 in Japan 3 in U.S.</td>
<td>About 60,000 total</td>
</tr>
<tr>
<td>Pre-Crash Safety</td>
<td>Millimeter-wave radar and computer detect if collision is unavoidable. Seatbelts tighten, brake assist and automatic braking are activated.</td>
<td>2003 Harrier,* Celsior</td>
<td>2</td>
<td>About 1,000 total</td>
</tr>
<tr>
<td>Lane Monitoring System</td>
<td>Rear camera tracks white lane markings on road. Gives audible warning of lane departure.</td>
<td>2002 Alphard* (Japan)</td>
<td>3</td>
<td>About 80,000 total</td>
</tr>
</tbody>
</table>

Source: Toyota Motor Corp.

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Convergence... a key automotive electronics executive with Motorola. Mr. Wilkie believes SAE's reputation in the automotive electronics community will improve. "I really think Ray Morris has changed the tenor of that organization," he said. Mindful of the need to mend relations with the industry, Mr. Morris said, "Our goal is to make Convergence the best it can be and forget about trying to impose any SAE structure on it."

Mr. Wilkie explained that the Convergence board will stay just as involved in the conference: "We name the chairman and the executive committee, and they name their subcommittees. If they need help, we give it to them; we review the program, things like that. It is what makes Convergence special." As more of the founders reach retirement, they hope to enlist the support of younger industry leaders who will bring new energy to Convergence while preserving the conference's valuable legacy. Convergence 2004 will be chaired by Dr. Gerhard Schmidt, vice president, research and advanced engineering at Ford. Larry Burns, vice president, R&D and planning for General Motors, has agreed to chair Convergence 2006. The Convergence board together with SAE set up a new entity, the Convergence Electronics Joint Program Office, made up of eight representatives, four chosen by the Convergence board and four by SAE. Currently chaired by Yazaki vice president, advanced technology, Myron Trenne, the joint committee will consider other opportunities to further support automotive electronics around the world, for example, a technical journal and other publications, perhaps an off-year Convergence meeting with the Japanese and/or the Germans or other conferences. Convergence will continue to provide charitable funding to the Convergence Education Foundation, which supports meaningful learning opportunities in mathematics, science and engineering. After Convergence 2002, $1 million was sent to the CEF.

Convergence 2004 will be held October 18–20, 2004 at Cobo Hall, Detroit. For more information visit www.Convergence2004.org or contact Denise Freitag at 313-337-9856 or dfreitag@ford.com.

Delphi Corporation Background

General Motors combined its parts operations in 1987 to form GM Automotive Components Group (ACG), which consisted of two divisions: Chassis and Transmission Components and Body and Engine Components. ACG became a separate business sector with an internal P&L and balance sheet in June 1994. The following year, GM renamed the ACG business Delphi Automotive Systems and in 1997, merged Delco Electronics into Delphi Automotive Systems. In 1998 GM announced its plan to spin off Delphi Automotive through an initial public offering, which was made on February 5, 1999.

Today Delphi has approximately 187,000 employees; about 70% of them work outside the United States. The company operates 169 wholly owned manufacturing sites, 42 joint ventures, 53 customer centers and sales offices and 32 technical centers, in 41 countries. Sales from Delphi’s Dynamics and Propulsion sector, which includes energy and engine management systems plus chassis, steering and thermal systems products, accounted for nearly half of Delphi’s total sales in 2002.

As of December 31, 2002 Delphi employed more than 16,000 engineers, scientists and technicians around the world with over one-third of them focused on electronics and high technology products and processes. The company introduced 184 new products and/or processes in 2002, a 46% increase over 2001. At year-end 2002, Delphi owned more than 5,700 patents and 7,500 patent applications worldwide.

Delphi Competitive Strategy

Delphi serves what chairman and CEO J.T. Battenberg III recently described as a “hypercompetitive” market. Given that assessment of the global market for automotive components, parts and systems, Delphi’s future success depends in no small measure on management’s ability to define and implement a competitive strategy that attracts a sufficient number of customers to its products—customers who are willing to pay high enough prices for Delphi to make greater profits than it has over the past five years. In that time period Delphi has failed to meet one of its long-term goals, to achieve 5% net margin.

On March 15, 2002, Delphi announced that the company would no longer be known as Delphi Automotive Systems, but simply Delphi, to reflect customer and market diversification. While the company would “remain very focused on our automotive business, removing the ‘Automotive Systems’ descriptor from our name will allow us to approach non-automotive customers with a name that stands for a leader in technological innovation in many markets,” according to the press release. A according to his “Dear Shareholders” letter in the 2002 Delphi Annual Report, Mr. Battenberg wrote that Delphi aims to be as ‘passionate’ about non-automotive business as it is about its automotive business.

Given the slim margins in the automotive market, Delphi believes it can increase profits by leveraging its technology outside the auto industry. While a decision to focus on other markets besides au-

The Company Profile Continued

### Distinctions Claimed by Delphi
- The world's largest automotive parts supplier
- The world's largest automotive integrated systems supplier
- The world's first supplier to produce passive occupant detection systems, in 2001
- The first company to develop a steering wheel with an integrated airbag system
- In 1973 Delphi engineered the world's first production airbag
- The first OEM supplier to commit to making satellite radios

automotive is about as strategically important as a business decision can be, Delphi hasn't yet publicly stated its goals for non-automotive sales as a percentage of total sales. The company did say that in 2002 its non-automotive sales grew by 48%, but it would only divulge non-automotive sales combined with commercial vehicle sales, a combined total of $822 million in 2002, equal to under 3% of Delphi sales.

Elsewhere, Delphi has described its commercial vehicle business as its second largest "customer" after GM.

According to Dave Wohleen, president of the Electrical, Electronics, Safety and Interior sector of Delphi, his sector has found a few opportunities for non-automotive sales, for example, electrical connectors and wiring products. "We found the know-how that goes into connectors, for instance, was transferable, whether it be to computer applications, appliances or high-security military applications." Mr. Wohleen cited Delphi's expertise in engine cooling and climate control systems as another example that has led to some development contracts. "We worked on the whole technology of heat transfer and how you get the heat out. That technology can be applied in non-automotive environments as well. ... We are just getting started."

Within the automotive market, Delphi has sought over the years to become less dependent on its former parent, General Motors. Through the first three quarters of 2003, sales to GM and its affiliates accounted for 61.4% of sales, compared with 1997, when GM accounted for 82% of Delphi sales. Delphi sales to GM will continue to decline. Worldwide, Delphi expects its non-GM sales to grow at over 10% per year, and by 2005 non-GM sales will account for well over 50% of sales. In 2002, about 54% of non-GM revenue was generated from markets outside North America.

Each year since 1999 Delphi has invested $1.7 billion in R&D. In a December 2002 press release, Delphi wrote that it has focused "more than 80% of its capital investment on electronics and electronically enhanced mechanical technologies." En route to greater profits, Delphi intends to continue investing predominantly in what it calls "game changing" and "leading-edge high technology" products at the expense of low margin commodity products like spark plugs and instrument clusters. In 2002, Delphi Delco's instrument cluster business was placed into the Delphi Automotive Holdings Group, but as yet Delphi has not found a buyer for it. A automotive Holdings is comprised of product lines and plants that do not meet Delphi's targets for net income or other financial metrics or are not core to Delphi. Managers focus on finding remedies for under-performing entities—either fixing, closing or selling them. Delphi Delco's instrument cluster business was assigned to the Automotive Holdings Group.

### Key Delphi Strengths
- "Customers buy from Delphi because of our technology portfolio, our breadth of knowledge, our level of systems integration, our capability to take a product from concept through design, development, validation and application. We leverage this across the world," said Mr. Wohleen.

While the company has closed over 121 plants since it became independent from GM, Delphi's market coverage has been strengthened, evidenced by the growth of non-GM business in Europe and Asia.

### Liquidity Crunch

According to Delphi's September 30, 2003 balance sheet, the company showed net liquidity of negative $2.0 billion, which is strongly indicative of a company having trouble paying its bills. Delphi calculates liquidity as cash and cash equivalents less total debt. On September 30, 2003 Delphi had current and long-term liabilities totaling $18.7 billion against stockholder equity of just $1.25 billion.

With equity so low, Delphi management has little freedom of action because outside creditors have a far bigger stake in the company than do its equity owners. Root continued on following page

### Top 11 Delphi Customers

<table>
<thead>
<tr>
<th>GM accounts for 61.4%</th>
<th>Honda</th>
</tr>
</thead>
<tbody>
<tr>
<td>of total sales</td>
<td>Hyundai</td>
</tr>
<tr>
<td>Alphabetically</td>
<td>PSA</td>
</tr>
<tr>
<td>BMW</td>
<td>Renault</td>
</tr>
<tr>
<td>DaimlerChrysler</td>
<td>Toyota</td>
</tr>
<tr>
<td>Fiat</td>
<td>Volkswagen</td>
</tr>
</tbody>
</table>

### Reorganization
- **Automotive Holdings Group** includes product lines and plants that do not meet Delphi's targets for net income or other financial metrics or are not core to Delphi. Managers focus on finding remedies for these under-performing entities—either fixing, closing or selling them. Delphi Delco's instrument cluster business was assigned to the Automotive Holdings Group.
- **Mobile Multimedia** is a unit within the Electrical, Electronics, Safety & Interior Sector.

*Note: At press time on November 12, 2003, Delphi announced some refinements to its reorganization. Effective January 1, 2004, the occupant protection business will join the Delphi Delco business, which will be known as Delphi Electronics and Safety, under Jeff Owens, president. Integrated closure systems, electronic controls for HVAC, plus the cockpits and interior business lines will be aligned with existing thermal product lines. That sector will be named Delphi Thermal & Interior.*
causes of Delphi’s financial problems: profits have not been good, and the company has had to make large payments to its under-funded pension plans. According to Standard & Poor’s analyst Martin King in an October 20, 2003 article published by RatingsDirect, “Delphi will have contributed $700 million to its pension plans during 2003, with an additional combined $1.6 billion required during 2004 and 2005.” In the first nine months of 2003 Delphi had a net loss of $138 million. In 2002 net income was $343 million, or 1.2% of sales. Delphi lost $370 million in 2001. A according to the October 20 article, Standard & Poor’s affirmed Delphi’s BB- credit rating. Delphi’s outlook is negative. BBB- is S&P’s lowest rating before non-investment (speculative) grade.

When Delphi went public on February 5, 1999, the stock was valued at nearly $19 a share. Soon after the IPO, the stock began to decline—from an all-time high of $21-plus per share, reaching an all-time low on March 17, 2003 of $6.39. On November 11, 2003 the stock was trading at $8.65 a share. Nevertheless, writes Mr. Battenberg in the 2002 Annual Report, “Shareholder value absolutely remains our long-term focus.”

Grundig Car InterMedia Acquisition

Despite Delphi’s financial difficulties, in November 2003, the company acquired the car radio division of Grundig AG for €55 million ($65 million) in cash for company stock plus about €3 million ($3.5 million) in debt. Grundig Car InterMedia System GmbH had sales of €180 million ($212 million) in 2002 with about 1,000 workers. Grundig AG (Nuremberg, Germany) declared bankruptcy in April 2003.

New UAW Labor Agreement

When it was spun off from GM, Delphi inherited a large labor force represented by the United Auto Workers (UAW) union, and Delphi was bound by the terms of a four-year wage and benefits contract negotiated by General Motors and the union in 1999. As a result, Delphi must pay about 16% of its workforce significantly higher manufacturing wages than its competition pays: nearly $25 per hour in North America vs. $14 to $20 for the competition.

In early October 2003, UAW members ratified a new four-year labor contract with Delphi that could slightly improve Delphi’s competitive picture. The new contract, which covers about 30,000 active Delphi employees, calls for smaller pay increases over the next four years than the 1999 agreement granted: 5% for the 2003 agreement vs. 12% for the four years covered by the 1999 contract. Under the new contract Delphi must give employees an upfront payment of $3,000, a lump sum payment equal to 3% of the employee’s wages in year two, and 2% and 3% wage increases in years three and four, respectively. A nother positive for Delphi: this is the last UAW agreement that will precisely follow the contract negotiated with General Motors. In 2007, Delphi will be able to negotiate independently from GM, according to what is best for Delphi. And finally, according to a UAW press release, Delphi will continue to receive special treatment from GM, which agreed to award about $1 billion worth of new business to Delphi as part of its commitment to “Look to Delphi first.”

Delphi and the UAW agreed to a two-tier wage, one for current UAW workers and some lesser amount for newly hired UAW employees, but the details of that agreement have not yet been completed.

On the negative side, however, Delphi’s massive retirement benefit obligations will continue to grow—by about $500 million as a result of the new contract, according to a Standard & Poor’s analyst. Current retirees will receive an $800 payment in each year of the four-year contract plus a $1,000 voucher in the first and third years of the contract toward purchase of a new GM vehicle. A nother negative result of the new contract, Delphi agreed to hire 750 new skilled trade apprentices over the contract’s four-year period. A bout the new contact with the UAW, Jeff Owens, Delphi vice president and president of Delphi Delco Electronics, told us, “I think the contract gives us a little more flexibility in terms of how we can competitively pursue business in this highly competitive environment. It was a good compromise. We will be happy to look to the next four years under the terms of the contract.”

Delphi Delco Electronics and Mobile Communications

Delphi Delco Electronics represented all the electronics and mobile communications product sector at the end of 2002. On January 1, 2003 that sector was renamed Electrical, Electronics, Safety & Interior. Headquarters: Kokomo, Indiana, USA

2002 Sales: $5,041 million

Employees: 27,000

2002 Sales per Employee: $186,704

Top Product: Electronic control units

Delphi Delco Background

In 1936, the Delco Radio division of General Motors was established in Kokomo, Indiana, with 428 employees. In the early 1970s Delco Radio was merged with GM’s A C Electronics division to form Delco Electronics, which in addition to a broad line of automotive electronics also produced navigation and guidance systems for the Apollo space program. In
1985, in support of GM’s acquisition of Hughes Aircraft, GM rolled Delco Electronics division, along with AC Spark Plugs and Delco Systems Operations into GM Hughes Electronics Corporation, which held together until 1997. During that year, GM sold Hughes Aircraft to Raytheon, dedicated Hughes Electronics to serving the space and telecom industries and brought Delco Electronics into Delphi Automotive Systems, where it was renamed Delphi Delco Electronics Systems. Following Delphi’s recent reorganization in 2003, the Delco Electronics business is now included in Delphi’s Electrical, Electronics, Safety and Interior sector, headed by Dave Wohleen.

In its 67-year history, Delphi Delco Electronics has evolved from one radio assembly plant in Kokomo to become a world-class innovator in automotive electronics technology, employing over 27,000 people in 16 countries. Delphi Delco operates 12 factories and three dedicated technical centers. In addition to car audio systems, Delphi Delco’s product portfolio includes a variety of components and systems—from custom-designed ICs to advanced occupant safety systems, multimedia entertainment and radar-based adaptive cruise control systems.

**Delphi Delco Product Strategy**

Delphi Delco focuses its product development strategy on what president Jeff Owens calls the four pillars for growth: Wireless, which consists of mobile multimedia, audio, antennas, amplifiers, radios and navigation; Safety; Powertrain; and Body, citing some successes the company is enjoying in those four growth areas, Mr. Owens elaborated on the company’s hottest-selling products and some products with significant growth potential.

**Satellite Radio**

"Satellite radio is very hot right now," declared Mr. Owens. "Since we started making them [in December 2001] Delphi has shipped over 1.2 million satellite radios.” With the vast majority destined for installation in General Motors vehicles, Delphi had shipped 475,000 satellite radios to the aftermarket plus an additional 770,000 for factory installation as of October 10, 2003.

XM Satellite Radio subscription sales have finally taken off. XM’s digital radio broadcasting service debuted in November 2001, and as of October 2003 more than one million subscribers were using the service. According to XM, among comparable consumer entertainment media, only DVD players reached the one-million-unit mark faster than XM Radio.

A corollary to Delphi, nearly 30% of vehicle owners say they want satellite radio in their next vehicle. Delphi offers three different satellite radios for the aftermarket: SKYFi, Roady and XM Commander. Delphi’s number-one selling satellite radio at $200, SKYFi is designed to work in the vehicle, in the home or with the SKYFi boom box. In September 2003, Delphi launched the Roady, priced at $120. The Roady, which can be plugged into the vehicle’s cassette player, uses the new ultra-thin XM Micro Antenna, the smallest XM satellite radio antenna on the market. Delphi started shipping the XM Commander receiver in October.

2003. The $159 radio will be distributed by Terk Technologies (Commack, New York). In addition to an extensive line of XM radios, Delphi also builds Sirius satellite radios. Sirius is XM’s only satellite radio broadcasting competitor. On September 30, 2003 Sirius had 149,612 subscribers.

**Passive Occupant Detection System (PODS)**

Delphi Delco’s passive occupant detection system, called Recognition, has been well received by carmakers: Over the last two years Delphi has shipped over 4 million PODS units. Among its PODS customers are: Ford (for its 2004 F150 pickups), Jaguar, Daimler-Chrysler, Volkswagen, Subaru and General Motors passenger cars and trucks, including Saturn. Delphi expects to have booked more than $350 million worth of annual PODS business by 2004.

continued on following page
The Institute for Traffic Accident Research and Data Analysis (ITARDA), Tokyo, advises that airbags used along with seatbelts provide the maximum safety for vehicle occupants. It cautions against the danger of injury if an airbag deploys in an accident and the occupant is unbelted. ITARDA’s data shows that in 2001 the death rate in accidents when the airbag deployed was significantly higher when the occupant was not wearing a seatbelt: 9.4% when seatbelts were not worn compared with 1.0% for belted occupants.

Beyond the diesel engine controller made by Delphi Delco, other Delphi divisions make diesel nozzles, injectors, pumps and common rail products. Applications include light-, medium- and heavy-duty passenger and commercial vehicles. Delphi will be producing about 2.5 million diesel systems per year by calendar year 2006. Delphi’s Multec common rail system is fitted by Renault/Nissan, PSA Peugeot Citroën, Hyundai/Kia, SsangYong and the Ford Premier Auto Group. Four additional vehicle manufacturers have also selected Delphi diesel systems for delivery beginning in 2005 and beyond. Delphi expects diesel engines to be installed in more than 45% of European cars sold by 2005, compared with about 39% today.

Other noteworthy products with strong growth potential, according to Delphi, include rear-seat entertainment systems, adaptive cruise control/collision warning systems and various parking aids.

### Safety Features Installed in Japan’s Top Selling Vehicles

The table below lists some of the safety features that were standard or optional in the fifteen top-selling models in Japan in 2002.

<table>
<thead>
<tr>
<th>Model</th>
<th>Airbags</th>
<th>Seatbelts</th>
<th>Brakes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Driver</td>
<td>Front</td>
<td>Side</td>
</tr>
<tr>
<td></td>
<td>Passenger</td>
<td>Airbag</td>
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<td>Honda Fit</td>
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<td>O</td>
</tr>
<tr>
<td>Toyota Vitz*</td>
<td>S</td>
<td>S</td>
<td>O</td>
</tr>
<tr>
<td>Toyota Noah*</td>
<td>S</td>
<td>S</td>
<td>X</td>
</tr>
<tr>
<td>Toyota Estima*</td>
<td>S</td>
<td>S</td>
<td>X</td>
</tr>
<tr>
<td>Toyota Voxy*</td>
<td>S</td>
<td>S</td>
<td>O</td>
</tr>
<tr>
<td>Nissan Cube</td>
<td>S</td>
<td>S</td>
<td>O</td>
</tr>
<tr>
<td>Honda Mobilio</td>
<td>S</td>
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<td>O</td>
</tr>
<tr>
<td>Honda Step Wagon</td>
<td>S</td>
<td>S</td>
<td>O</td>
</tr>
<tr>
<td>Toyota Crown*</td>
<td>S</td>
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<tr>
<td>Honda Stream</td>
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<td>S</td>
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</tr>
<tr>
<td>Nissan Serena Wagon</td>
<td>S</td>
<td>S</td>
<td>O</td>
</tr>
</tbody>
</table>

*Options vary on some trim levels
S = Standard feature, O = Optional feature, X = Not Available

Source: Japan’s Ministry of Land, Infrastructure and Transportation