Speech Recognition Leaders Go Topsy-Turvy

A year ago if somebody asked for the names of the top players in automotive speech recognition, Temic would most certainly have come up as a name in the European market, and Lernout & Hauspie in the U.S. market. Today, L&H is in bankruptcy, its core technology for sale, and its place of leadership in automotive speech engines challenged by Visteon.

Temic’s speech processing division is still the leader in speech technology in Europe. MY 2002 vehicles from Audi, BMW, Mercedes and Porsche will use Temic’s third-generation, MOST-based speech processing solution. However, the future ownership of Temic’s speech processing division is in question. Although in April 2001, Continental acquired 60% of Temic from its parent Daimler Chrysler, the speech-processing activities stay with Daimler Chrysler, who will be looking for a partner with whom to share ownership.

Despite turbulence in today’s speech recognition industry, which has led to delays, progress in speech technology continues. Ultimately, every vehicle will have speech technology, either embedded in the vehicle’s on-board computer or available from off-board servers via a cellular connection, or some hybrid of the two. Advancements in speech technology including speech recognition, speech synthesis and the user interface, will lead to progress in telematics and on-board navigation systems, as well as greater safety and enjoyment for motorists.

Ford’s former parts division, Visteon, seems to be emerging as a contender for leadership with its Visteon Voice Technology. According to some automotive speech experts, Visteon’s speech recognition engine produces much more natural sounding results than the L&H speech engine.

X -by-Wire Communications Protocol: Possible FlexRay and TTP Merger

Politics is the Biggest Issue

Last fall, two of the world’s leading carmakers, BMW and Daimler Chrysler announced their decision to use FlexRay, an in-house designed, safety-critical x-by-wire communications protocol based partly on Byteflight, the time-triggered protocol initially developed by BMW as a communications protocol for airbag and seatbelt restraint systems. FlexRay is backed by BMW and Daimler Chrysler; both carmakers plan to put the communications protocol into series-production vehicles in steer- and brake-by-wire applications.

In the past, German cooperation has successfully led to global accommodation of these existing or potential standards: low-speed LIN, medium-speed CAN, high-speed MOST communications protocols and the OSEK operating system. In addition to BMW and Daimler Chrysler, FlexRay is supported by two key semiconductor suppliers, Philips Semiconductor and Motorola Semiconductor Products Sector; Motorola is the largest and most influential automotive chipmaker on the planet. Given this level of support for FlexRay, one would expect that it too would become a global standard.

Yet for nearly ten years, Daimler Chrysler did research using the safety-critical communications protocol based on TTP (Time Triggered Protocol) technology, which was developed by Professor Hermann Kopetz, of the Technical University of Vienna. While TTP was developed for the aerospace industry, the carmaker researched the feasibility of using TTP in x-by-wire applications. Later, the company realized that some changes were needed to make TTP more appropriate for automotive applications, given that automotive safety requirements, while a top priority for Daimler Chrysler, can be less stringent than those for airplanes. TTP creator Dr. Kopetz would not agree to the changes, arguing that the proposed changes would compromise vehicle safety.

A accordingly, Daimler Chrysler shifted its support to the FlexRay safety-critical communications protocol. Dr. Thomas Raith, responsible for systems integration of electrical and electronics systems at Daimler Chrysler, told us, “In the vehicle you should be able to have some small disruptions, electromagnetic interference for instance, and still allow the vehicle to be operated. ... If a plane has a small problem, it has to stay on the ground. If you did that with cars, you’d have a lot of angry drivers.”

Last year the FlexRay consortium invited the VW Group to join them, but by then Audi and Volkswagen seemed to be leaning toward TTP, and would not join FlexRay without further study of the pros and cons of both FlexRay and TTP. This past February, Audi seemed to be siding with TTP. In a February press release, the company founded by Dr. Kopetz to commercialize TTP technology, TTP Tech Computertechnik A G (Geneva, Switzerland), announced that Audi and TTP Tech formed a technical partnership to create a time-triggered electronic architecture for the automotive mass market, an alternative to FlexRay.

All parties involved in this discussion are aware of the negative effect that competing standards would have on the industry. If both FlexRay and TTP became automotive standards, suppliers to Daimler Chrysler, BMW and V W would have a difficult time supporting either protocol, since the market for either protocol would shrink significantly. Dr. Raith was emphatic, “It would be a disaster to have two standards; I will do everything!”
FlexRay...

Continued from page 1

Decision-making by large groups has been a problem in the past for some standards-making efforts. One level removed from the core would be a premium associate layer, made up of partners with experience in x-by-wire systems. The final layer would be associate members, any other companies that want to use the standard.

Technical Differences

While the main issues are political, serious technical differences still separate TTP and FlexRay advocates. The technical issues seem to come down to safety. Dr. Kopetz is adamant that safety can never be compromised. The FlexRay people agree that safety should be the number-one priority, but they want a communications protocol that will be acceptable to drivers.

In the December 2000/January 2001 Hansen Report, an article on page one outlined some of the technical issues FlexRay had with TTP. That brought a response from Dr. Kopetz, who took issue with the view presented by FlexRay advocates. We shared Dr. Kopetz's response with the FlexRay people, who put forward more technical arguments. Copies of those communications are available from The Hansen Report. Call 603-431-5859 or email hansen@nh.ultranet.com.

The Hansen Report on Automotive Electronics

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2000 Roundup of European Automotive Electronics Suppliers

Bosch Automotive Technology
2000 Sales: DM 43.5 billion ($19.6 billion)
Change from 1999: up 23.9%, including the first-time consolidation of Bosch Automotive Systems, formerly Zexel (Japan)

2000 Profits: “Unsatisfactory” and “disappointing” were the comments of Dr. Hermann Scholl, chairman of Bosch’s board of management.

While automotive group sales have grown, profits are down due to new product R&D and plant investments for expanding production of diesel engine parts. A nother factor in lower margins is the continued demand by carmakers for lower prices. Bosch attributes positive sales growth to increased demand for diesel injection systems, worldwide and especially in Europe.

In 2000, automotive equipment accounted for 71% of Bosch Group sales worldwide. In 2001, Bosch expects that to drop to 65%, as auto production declines 5% worldwide. Bosch’s North American subsidiary, Robert Bosch Corporation, grew automotive sales 4.8% in 2000, to $4.4 billion (including joint ventures).

Continental Automotive Systems
2000 Sales: €3,023 million ($2.663 billion)
Change from 1999: up 18.8%

2000 EBIT: €100.4 million ($88.6 million), compared with €58.7 million ($51.8 million) in 1999

Strong demand gave the ABS/ESP (Electronic Stability Program) business unit 54% of the division’s sales in 2000. Sales of ESP units jumped from 400,000 to 1.4 million, and based on booked orders, Continental expects sales to reach 3.4 million units in 2003.

With the acquisition of 60% of Temic from DaimlerChrysler in August 2000, Continental will focus on developing complete chassis systems. In concert with the slogan “total chassis control,” Continental AG will divest “large parts” of the ContiTech G group, retaining just the two business units related to chassis control; 68% of ContiTech G group sales is automotive.

MagnaTec
2000 Sales: €4,451 million ($3,926 million)
Change from 1999: up 9.6%

2000 Operating Margin: 1.2% of sales; in 1999 operating margin was 2.7% of sales.

In 2000, Fiat S.p.A., increased its stake in M agneti Marelli to 98%; that should simplify its planned piece-by-piece divestiture of the rest of the company. In 2000, Magneti Marelli sold its thermal systems business to Denso and also sold its lubricants, mechanical components and rearview mirror businesses. Two of the four remaining businesses are involved with electronics: powertrain controls and exhaust systems, which had roughly a 5% operating profit in 2000; and cockpit instruments and telematics products, which was not profitable.

Mannesmann VDO
2000 Sales: €4,100 million ($3,617 million)
Change from 1999: up 18.4%

Mannesmann VDO reported an 18% increase in sales of automotive electronic components, modules and systems. The company produced 1.1 million cockpits in 2000, increasing cockpit production on all continents and won a new contract to develop multimedia systems for BMW.

Upon completion of the Siemens/Bosch acquisition of Mannesmann VDO, later this year, Mannesmann VDO, which was not profitable.

Siemens Automotive

Visteon, Delphi and Bosch. It also demonstrates Siemens’ commitment to developing higher-margin systems and modules.

Siemens will supply an integrated starter generator (ISG) as standard equipment on a MY 2003 European small car platform, which will be introduced in September 2002. According to the company, its ISG technology will make a significant contribution to fuel-economy improvement goals set by the makers of SUVs.

Visteon

2000 Sales: €1,067 million ($941 million)
Change from 1999: up 19.9%

With over 5,000 employees worldwide, DaimlerChrysler’s automotive electronics subsidiary has six business units: powertrain and chassis, body electronics, occupant safety, A/B/S, sensor systems and automotive electric motors. In the first two years since the launch of its speech processing engine, Temic sold 200,000 units, according to the company.

On April 2, 2001, Continental concluded an agreement to purchase Temic from DaimlerChrysler. Continental will initially take a 60% stake in Temic with an option to purchase the remaining 40% later. Temic’s speech processing division remains with DaimlerChrysler.

Valeo

2000 Consolidated Sales: €9,120 million ($8,045 million)
Change from 1999: up 18%

2000 Operating Margin: 6.3%, operating income was up 18%.

By region, Europe generated 61% of Valeo’s sales; North America, 29%; South America, 3% and Asia, 7%. External growth accounted for 8.5% of Valeo’s sales growth in 2000; 5.5% was due to exchange rate variations. Spending for R&D was 6.3% of sales, compared with 6.8% in 1999. In anticipation of lower vehicle production in North America in the coming year, Valeo intends to cut its U.S. workforce by 1,000 this year and close at least one U.S. manufacturing facility.

The acquisition of Sylea, Labinal’s automotive wiring business, in May 2000 also contributed to sales growth. Sylea increased sales by 16.4%, but the subsidiary ended the year with a net loss of 7.1%, due to price pressures.
The Company Profile... Donnelly Corp.

Background
Donnelly Corporation, founded in 1905, has 50 years experience in mirror design, more than 20 years in interior lights and 15 years in optical sensors and cameras. Currently, the company describes itself as a technology-driven, customer-focused and growth-oriented global supplier to every major automotive manufacturer in the world. Donnelly claims to be the number-one maker of rearview mirrors in the world, with products on over 35 million of the 55 million vehicles produced globally each year. Operating from 12 countries worldwide, the company also makes exterior mirrors, rearview mirror assemblies, window modules and door handles.

Donnelly's main product is rearview mirrors, which yielded $434 million in sales in 2000. In 2000, the company shipped 35 million mirrors, of which 20 million were complete interior mirrors and 7 million prisms (without housings). The average price per unit of mirrors was $12.40. While Donnelly says it has as much as $300 worth of product content on some vehicles, the current average per vehicle in North America was $36, and on some vehicles, the current average per mirror was as high as $300 worth of product content.

Distinctions Claimed by Donnelly
- Worldwide, the #1 maker of automotive rearview mirrors
- Largest share of the U.S. market for rearview prismatic mirrors (manually operated to reduce glare from headlights)
- For five consecutive years, Donnelly has been one of the top 10 injection molding companies in America, according to Plastics News.

Unlike in the developing world, mirror unit sales growth in Europe, Japan and North America is, and will continue to be, basically flat. Therefore, the company sees adding electronics content to products like mirrors and door handles as the best way to grow sales. In addition to increased electronics in existing products, the company aims to sell other electronics assemblies as well. With that strategy in mind, the company is looking to achieve a growth rate of 15% per year over a five-year period, sometime within the next 10 years. The company claims to have some electrical or electronics content on about 50% of its products already.

In November 2000, Johnson Controls, a major manufacturer of interior systems, seat systems and batteries, purchased 1.54 million shares of Donnelly stock, a 14.9% ownership position. (In 1996, Johnson Controls acquired Prince Holding Corporation of Holland, Michigan, maker of HomeLink Universal garage door openers, electronic compasses and trip computers.)

Focus on Electronics
Today, a small percentage of what the company makes is electronic, but electronics is an essential ingredient in Donnelly's strategy to add value to its existing products and develop new products. Donnelly expects recent efforts to reposition the company by putting into place the design and manufacturing infrastructure to develop substantial electronics products.

The company talks about electronics in future products, but the company would not tell us the dollar value of the electronics it actually ships today. Our sense is that current electronics content is rather modest, and unless the company makes a major acquisition in electronics, it will be ten years or more before electronics account for a majority of Donnelly’s revenue.

Donnelly’s emphasis on increasing electronics content is apparent in its new organization into two product groups: Electronics Systems Group and Exterior Systems Group. A more electronics are packaged with interior mirrors, Donnelly expects the Electronics Systems Group to be the faster-growing of the two, achieving annual growth rates in excess of 15%. During 2001, Donnelly is transitioning this product-based organization into a global operation; each product manager will be responsible for business worldwide.

The Electronics Systems Group includes interior mirrors (70% of which have no electrical parts), electronic components, camera vision systems and information system products. (Information system products, mostly coated bent glass used for CRT displays, are not made for the auto industry.) Exterior Systems Group products include exterior mirrors, door handles and windows, all of which can sometimes have electronic and/or electrical parts packaged with them. Sales of electronics will always show up in the group that sells the end product to the OEM.

Organization by Product Group
Electronics Systems Group
- Interior Products (mirrors, mostly)
- Electronics
- Camera Vision
- Information Products
Exterior Systems Group
- Exterior Mirrors
- Door Handles
- Windows

On March 14, 2001, Donnelly announced that it had completed the acquisition of Donnelly Electronics, a company with $30 million in sales in 2000 and roughly 200 employees. Since 1997, Donnelly has owned a minority position in Donnelly Electronics, founded in 1996. Donnelly Electronics designs and manufacturers a variety of circuit board assemblies and sensors that are used in some Donnelly electronics products and subassemblies, including components for electrochromic mirrors and electronic compass systems. Donnelly Electronics has also pursued business with other automotive suppliers as well as non-automotive customers. Donnelly Electronics was headquartered and does some manufacturing in Holly, Michigan, where it has a 35,000-square-foot facility. The company also has a 25,000-square-foot manufacturing facility in Longford, Ireland.

Aquisition of other electronics companies are likely. “We are actively looking to expand our business in the electronics area, noted Frank O’Brien, vice-president of corporate planning. “One area of interest is camera vision systems, which will one day replace rearview mirrors.” Mr. O’Brien is also in charge of camera vision at Donnelly.

Interior Mirror: A Place for More Electronics
Donnelly interior-mirror literature states: “The mirror is no longer a mirror. It is a prime location for vehicle electronics.” Since the interior mirror is typically nothing more than a piece of reflective glass in an otherwise empty plastic housing, Donnelly sees that empty space as a place to install electronics parts and components. That does make a lot of sense, given the rearview mirror’s proximity to the driver, with its line of sight both rearward and forward, as well as the fact that drivers glance at it, on average, every 15 seconds, and given that the instrument panel has become very crowded. Here are some of the electronics that are being installed in, or hung from, the interior rearview mirror: telematics, GPS module, GPS/cellular antenna, cellular module, hands-free microphone, electrochromic automatic dimming mirror components, compass/temperature sensors, JCI Home-Link (universal garage-door opener), yaw display, security monitoring (tracking), remote vehicle control, automatic high/low-beam headlamp control, indicator...
LEDs for alarm/immobilizer system, tire pressure display for run-flat tires, on/off indicator LEDs for passenger airbags, fog sensing/signaling module, rain sensor, obstacle detection, remote keyless entry, comfort/convenience features, map lights, time display and memory mirror.

Electrochromic Mirrors

One value-added feature for interior and exterior mirrors is electrochromics to make the mirror automatically dim when light hits it. Electrochromic mirrors cost carmakers about $25 compared with $3 to $4 for a prismatic mirror, which manually dims, but drivers, particularly older drivers bothered by glare at night, like the automatic feature.

Gentex (Zeeland, Michigan) was one of the first companies to use electrochromic technology to darken materials, and the first company to make electrochromic products for vehicles. As a result, Gentex got a jump on the automotive electrochromic-mirror market, despite the fact that other suppliers, like Donnelly, had much bigger shares of the existing rearview-mirror market. Donnelly expects to close the gap with Gentex by the end of the year.

Donnelly has 27 million interior mirrors (20 million complete and 7 million prisms) shipped worldwide annually, about 1.5 million interior mirrors come with some interior illumination, like map lights. Some of these mirrors also include electronics content for timed lighting.

Donnelly (Kaimeido, make electrochromic mirrors. Companies, Tokai Rika and Murakami Kameido, make electrochromic mirrors. Gentex electrochromic mirrors use fluid material and that will not work if the glass is cracked or broken. In addition to Gentex and Donnelly, two Japanese companies, Tokai Rika and Murakami Kameido, make electrochromic mirrors.

Hotest New Products: Camera Vision Systems and SmartRelease

Camera Vision: For the last ten years, Donnelly has been working on a camera vision system that it believes is so superior to rearview mirrors that it will ultimately replace mirrors. The company, which now has 15 engineers working on camera vision systems, expects that at the earliest, car-makers will begin to apply cameras to the vehicle around 2006. Nevertheless, declared Mr. O’Brien, “I firmly believe that there will be some sort of camera on every vehicle in the United States in ten years.”

Much safer than mirrors, camera systems have far fewer blind spots and could prevent backing accidents. A camera on the National Highway Traffic Administration, for an object detected, is mounted on the windshield of the vehicle around 1999, Donnelly introduced an electrochromic mirror that uses Solid Polymer Matrix technology that works on a pinch of the darkening material between two pieces of glass. In contrast, Gentex electrochromic mirrors use fluid material and that will not work if the glass is cracked or broken. In addition to Gentex and Donnelly, two Japanese companies, Tokai Rika and Murakami Kameido, make electrochromic mirrors.

Company has 18% of the worldwide market for electrochromic mirrors, and 35% of the European market.

In November 1999, Donnelly introduced an electrochromic mirror that uses Solid Polymer Matrix technology that works on a pinch of the darkening material between two pieces of glass. In contrast, Gentex electrochromic mirrors use fluid material and that will not work if the glass is cracked or broken. In addition to Gentex and Donnelly, two Japanese companies, Tokai Rika and Murakami Kameido, make electrochromic mirrors.

Estimated Shipments of Electrochromic Mirrors by Gentex and Donnelly

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<tr>
<th></th>
<th>2000</th>
<th>2001</th>
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<tr>
<td>Donnelly</td>
<td>117</td>
<td>512</td>
</tr>
<tr>
<td>Gentex</td>
<td>375</td>
<td>550</td>
</tr>
<tr>
<td>Total</td>
<td>492</td>
<td>1,062</td>
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Donnelly Electrical and Electronics Products

Donnelly makes electrochromic mirrors for these carmakers:

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<th>Company</th>
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<tr>
<td>Audi</td>
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<td>Jaguar</td>
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camera vision system that created a panoramic, 170° view out the rear of the vehicle. The vision system, called Panoramic Vision, uses a rearview camera mounted on the vehicle’s trunk. Eventually, it could replace the interior mirror, although that would require a change in the legislation that currently mandates the interior mirror. Two cameras replace the two exterior mirrors. By eliminating the need for outside mirrors on the Precept, GM engineers estimated they were able to reduce vehicle drag considerably and get an improvement in aerodynamics of about 15%, according to Mr. O’Brien.

A three camera images are merged into one display, presented to the driver just above the center of the dashboard. One of the greatest challenges in implementing Panoramic Vision was software. Since the side-mounted cameras are farther from the scene than the trunk-mounted camera, and therefore slightly out of synchronization, software must make the three video signals appear as one.

New CMOS cameras are promising because they are less expensive and perform better than CCD cameras. Still, more costs must be squeezed out of the product before CMOS cameras will begin to supplant rearview mirrors in high-volume applications. Each camera includes a chip, camera lenses and other electronics that must be packaged with electrical connections in an environmentally protected housing. A camera on the Precept, a CMOS camera might cost $30, and the complete camera might cost the OEM $100 to $120, or from $300 to $360 for the complete system.

SmartRelease: In 1998, 11 children climbed into car trunks, inadvertently...
locked themselves in, and died. GM asked Donnelly to design a manual trunk release that children could operate from the inside; it included a phosphorescent handle. GM found that half of all kids under four years of age could not figure out how to unlock the trunk before the trunk hood is automatically released. “SmartRelease is probably the single most important new product this year,” declared Mr. O’Brien.

Starting in September 2001, U.S. legislation has mandated that all new vehicles must have trunk-release mechanisms, although the release can be a manual type. GM has said that by 2003, it will install an automatic trunk release in every new GM product with a trunk. Donnelly is currently GM’s only nominated supplier. SmartRelease will debut on the 2002 Chevrolet Impala and Monte Carlo.

**Interior Mirrors for OnStar**

In 2000, Donnelly started producing for GM, interior mirrors packaged with some OnStar components. OnStar mirrors, assembled with a microphone and cell-phone transceiver, have become one of Donnelly’s fastest-growing new products. GM is determined to make OnStar available across all models, and rather than wait for the instrument panel to be redesigned, the mirror offers a place to package new electronics features right away. Once power is brought to the mirror for OnStar electronics, adding electrochromics is not very expensive, so some OnStar mirrors are also electrochromic. Donnelly shares the OnStar business with Gentex.

**New Exterior Mirror Features**

In addition to electrochromics, Donnelly offers exterior mirrors with the following features, which are becoming more popular in the U.S.: memory actuators, TurnSignal, power-folding mechanisms and ground illumination. Mr. O’Brien suggested that a feature common in Europe and Japan, the power-folding exterior mirror, is making its way to the United States, not because of tight spaces like in Europe and Japan, but because some upscale vehicles have gotten so large they are difficult to park.

Donnelly offers a memory actuator mirror that automatically tilts when the vehicle is shifted into reverse to enhance the driver’s ability to see the distance between the rear tire and objects behind the vehicle. An exterior mirror feature called TurnSignal, for which Donnelly has a patent, functions as a supplemental turn-signal indicator, projecting a beam both forward and rearward to warn drivers in adjacent lanes when the vehicle is about to change lanes. Ground illumination, which is activated by the key fob as the driver approaches the vehicle, lights the ground around the driver’s door.

TurnSignal and the memory actuator mirror with reverse tilt are currently available on GM’s GMT360 line of mid-sized SUVs—the GMC Envoy, Chevrolet TrailBlazer and Oldsmobile Bravada. The power-fold mechanism is an option on GMT360 models exported out of the United States. Ground illumination will be available on the 2002 Ford Expedition and Taurus.◆
Consumer Reports 2000 Quality Survey

Every spring, with the arrival of Consumer Reports’ Annual Auto Issue, The Hansen Report takes a look at the carmakers’ progress in solving the problem of electrical system reliability in vehicles. When we first started analyzing Consumer Reports’ Frequency of Repair survey data nearly a decade ago, electrical systems were the most troublesome part of the car. This is no longer the case, according to the owners of over 500,000 model-year 2000 vehicles, who responded to the magazine’s survey. Electrical systems now rank equally with body integrity and hardware as the only remaining “areas of concern.” Among electrical areas of concern, power accessories and controls stood out.

To determine the percentage of each carmaker’s vehicles with electrical system problems, we weight Consumer Reports’ Frequency of Repair data for model year 2000 with total U.S. sales by model (or registrations if necessary). For six of the nine carmakers we ranked, survey respondents reported fewer serious electrical system problems per hundred vehicles, compared with last year.

After six consecutive years with the best record, Honda fell to third place for 2000 model-year vehicles, behind Toyota and Nissan, specifically because of a higher-than-average number of electrical problems with Honda’s Odyssey minivan. Between 5% and 9.3% of Odyssey drivers experienced electrical problems with their 2000 model-year vehicles.

Ford, GM and Chrysler had almost identical scores: 3.06 problems per hundred for GM; 3.09 problems for Ford; and without Mercedes, Chrysler had 3.03 problems per hundred vehicles, the best of the Big Three. As was the case with 1999 vehicles, Mercedes owners reported the most electrical system problems, 7.2 per hundred vehicles. •

Speech...

Because of the Dragon acquisition, L&H had the rights to critical pieces of the Dragon speech technology that Visteon customized for use in its second-generation speech engine, namely C-REC and SDX. C-REC is a continuous, speaker-independent, phonetic-based speech recognition engine, and SDX is an application-programming interface. C-REC is a key component of the Visteon speech recognition engine installed in the latest Jaguar model.

In March 2001, L&H sought approval from U.S. Bankruptcy Court to conclude the sale of C-REC and SDX to Visteon for $13.1 million in cash. In the deal, Visteon agreed to release L&H from all obligations and consider all legal disputes resolved. A part of the Dragon technology agreement, L&H agreed to assist Visteon in recruiting certain current and former L&H employees for a new Visteon subsidiary devoted to the advancement of speech technology in automotive and other applications. The new subsidiary will have approximately 30 employees, with headquarters in Burlington, Massachusetts (also L&H’s U.S. headquarters), and an office in Bristol, England.

L&H says it is working on a number of new applications, some of which will appear in MY 2002 and MY 2003. The AutoPC successor, Joyride, will probably be in the market this fall. L&H makes the speech and text-to-speech engines for the AutoPC and Joyride; the same speech recognition engine will be used in Joyride as was used in the AutoPC. (Clariion has sold 6,000 to 7,000 AutoPCs so far.) L&H also serves Acuna (formerly SmartM ove), Celport Systems (hands-free cell-phone docking stations), Delphi Delco and Pioneer. Besides speech engines, L&H supplies its automotive customers with engineering and development tools and professional services. With cash in very short supply, L&H’s remaining core speech and language technologies, as well as its ongoing automotive business, are for sale.

A according to The Wall Street Journal’s online division, DaimlerChrysler was in negotiations with Lernout & Hauspie this past January to buy L&H’s automotive speech technology, but the deal was not completed. A Wsj contact close to L&H, claimed the deal would have brought L&H as much as $250 million. •

| Percentage of MY 2000 Light Vehicles with Electrical System Problems, by Carmaker |
|---------------------------------|---|
| Toyota                         | 1.59 |
| Nissan                         | 1.62 |
| Honda                          | 1.75 |
| Mazda                          | 2.28 |
| GM                             | 3.06 |
| Ford                           | 3.09 |
| DC                             | 3.27 |
| BMW                            | 4.92 |
| VW                             | 6.28 |

Sales for our calculations are from Automotive News and the carmakers; registrations are provided by The Polk Company.

Consumer Reports 2000 Quality Survey

Percentage of MY 2000 Light Vehicles with Electrical System Problems, by Carmaker

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Nissan 1.62
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VW 6.28

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