

**Japan**  
**Car Navigation**  
**& Telematics**  
**Market 2003**

**Sample Page**

**SRD JAPAN, INC.**

#### 1-4. Global Navigation OEM Sales

The following table shows the relationship between car manufacturers and navigation suppliers.

#### Navigation Market(OEM/Supplier)

(October/2002 date)

OEMs	Ja pan		USA	Europe
	Factory installed	Dealer installed		
Toyota	Denso Aisin AW Panasonic	Pioneer Panasonic AisinAW/FujitsuTen Denso/Fujitsu Ten	Denso AisinAW	AisinAW Denso
Nissan	Zanavi Clarion Panasonic	Clarion Panasonic Pioneer	Zanavi	Zanavi
Honda	Alpine Mitsubishi Elec Panasonic	Fujitsu Ten/Denso Clarion Kenwood	Alpine	Bosch Alpine
Mitsubishi Motors	Mitsubishi Elec	Mitsubishi Elec AisinAW Panasonic Pioneer Kenwood		AisinAW
Mazda	Panasonic Clarion	Panasonic		
GM			Delphi (AisinAW, Zanavi) Denso	SiemensVDO Denso
FORD			Visteon Alpine Clarion	Bosch
Daimler - Chrysler	Panasonic Alpine Bosch		SiemensVDO Bosch Alpine	Bosch SiemensVDO Becker,Alpine
BMW	Alpine		SiemensVDO	Bosch SiemensVDO Alpine
VW			Bosch	Bosch AisinAW
AlphaRomeo			Bosch , Siemens	Bosch , Siemens
PSA				Sagem MagnetiMarelli Clarion
Renault				SiemensVDO Becker Sagem
Porsche			SiemensVDO	Siemens(IDIS)
Vauxhall				SiemensVDO
Fiat				Bosch MagnetiMarelli
Jaguar	Denso		Denso	Denso

## Chapter2, Forecast of Global In-Car-Computing Market

### 2-1, Forecast of Global In-Car-Computing Market

Global in-car-computing market forecast (volume)

unit: 1000

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Japan	Storage type navigation/car PC	1,100	1,400	1,600	1,800	2,100	2,300	2,500	2,600	2,500	2,400
	Telematics		5	10	40	100	150	300	500	1,000	1,500
	Car digital broadcasting								300	500	800
	<b>Total</b>	<b>1,100</b>	<b>1,405</b>	<b>1,610</b>	<b>1,840</b>	<b>2,200</b>	<b>2,450</b>	<b>2,800</b>	<b>3,400</b>	<b>4,000</b>	<b>4,700</b>
US	Storage type navigation/car PC	20	30	100	200	250	300	350	450	600	800
	Telematics			200	900	1,460	1,912	2,842	4,391	6,309	8,011
	Car digital broadcasting					100	400	1,000	1,500	2,000	3,000
	<b>Total</b>	<b>20</b>	<b>30</b>	<b>300</b>	<b>1,100</b>	<b>1,810</b>	<b>2,612</b>	<b>4,192</b>	<b>6,341</b>	<b>8,909</b>	<b>11,811</b>
Europe	Storage type navigation/car PC	130	260	500	800	900	1,000	1,100	1,200	1,300	1,400
	Telematics			100	600	1,000	1,200	1,440	1,728	2,074	2,488
	Car digital broadcasting	130	150	200	300	500	700	900	1,200	1,500	1,800
	<b>Total</b>	<b>260</b>	<b>410</b>	<b>800</b>	<b>1,700</b>	<b>2,400</b>	<b>2,900</b>	<b>3,440</b>	<b>4,128</b>	<b>4,874</b>	<b>5,688</b>
	<b>Grand total</b>	<b>1,380</b>	<b>1,845</b>	<b>2,710</b>	<b>4,640</b>	<b>6,410</b>	<b>7,962</b>	<b>10,432</b>	<b>13,869</b>	<b>17,783</b>	<b>22,199</b>

The table above shows the In-Car-Computing market forecasts.

The Japanese navigation market is already mature. It has accomplished a minute increase in sales by introducing new products that stimulate the need to replace. Growth is expected to be maintained right up until 2005. In 2006 there will be an advance towards a shift to telematics with 3G and we will likely see a decline in storage types. 2002 unfolded with Nissan spearheading telematics with the introduction of Carwings and Toyota following with G-Book.

Nissan's strategy is to install them in all their new model cars.

The U.S. still limits the need for car navigation systems for car enthusiasts and rental cars. Only OnStar is putting up a good fight for telematics. GM, Toyota, Honda and VW are steadily increasing its use in its luxury car line. Ford is moving at a sluggish rate. The delay in cellular

## **1996**

What received the most attention in the navigation market in 1996 was the VICS service. There also were businesses that planned to open an information service business for car. With the start of the VICS service, the VICS adapter market began. User can use real time traffic information. New functions such as “search from a phone number”, “expanded map of an intersection”, “golf, ski, software for travel” are being launched one after the other.

In 1996 navigation system manufacturers and automakers started to ship navigation systems to Europe and the U.S. The entry of overseas manufacturers such as Delco, Bosch and Phillips was noticeable. However, it seems that the overseas market did not really get started until after 2000 for Europe and after 2001 for the U.S.

## **1997**

In 1997, for the first time OEM car navigation market surpassed the aftermarket. Thereafter, the OEM option market grew and progressed.

In 1997 the car navigation market saw the appearance of the DVD navigation and a built-in receiving unit for D-GPS.

## **1998**

At the turn of 1998, the DVD navigation market expanded as a result of the lead taken by Pioneer, Alpine and Panasonic.

In Japan market, the OEM market, especially dealer installed option, was basically expanding.

## **1999**

In 1999, it is said that the number of passenger cars reaches 20,000,000. Similarly the number of car navigation systems operating in Japan is 3,750,000 (calculation of the number shipped by the end of the 1995-1998 period.) The penetration ratio of car navigation systems being installed in cars is thought to be  $3,750,000 \div 200,000,000 =$  approximately 18.8%.

Along with the OEM and aftermarket navigations, products that can handle information services, such as Monet and Compass Link, were introduced.

From 1999 the European navigation market truly got going. The scope of the market was over 500,000.

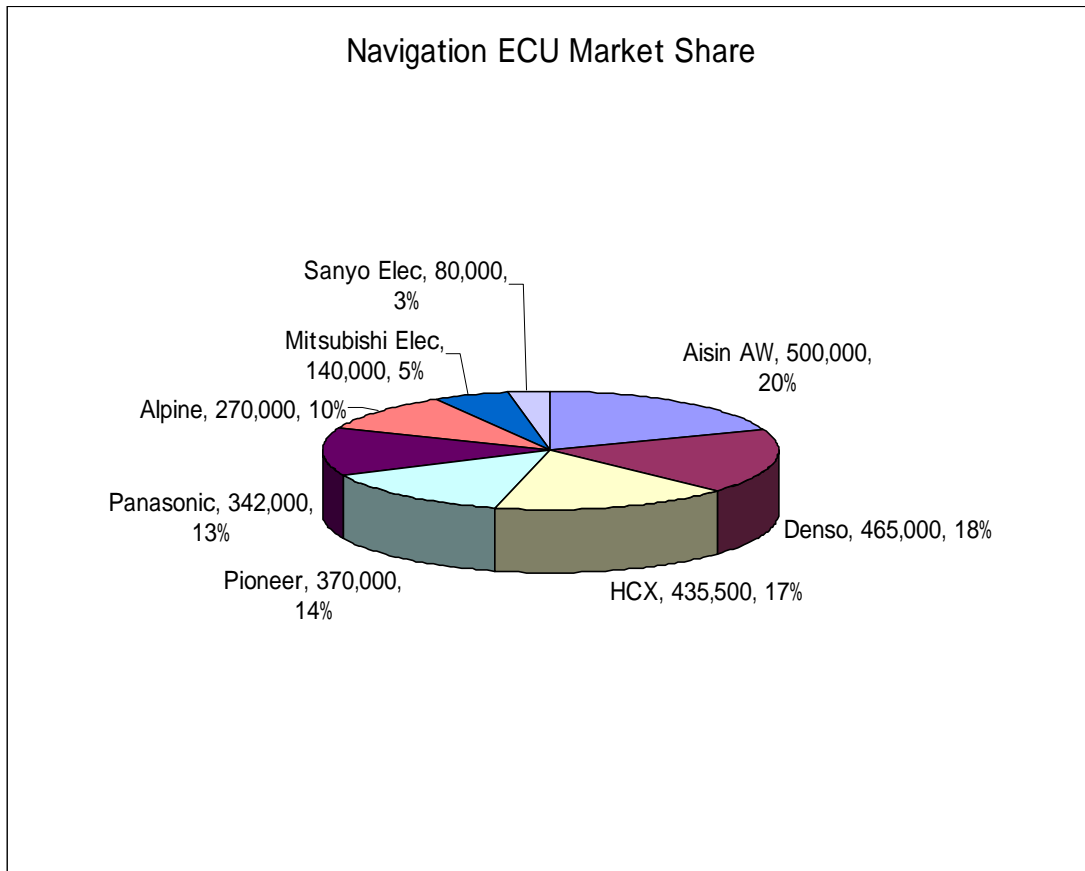
## **2000**

Fall of 2000, for the first time an Alpine navigation became compatible with the Sony “memory stick.” Attention is placed on technology such as navigation compatible with VICS3

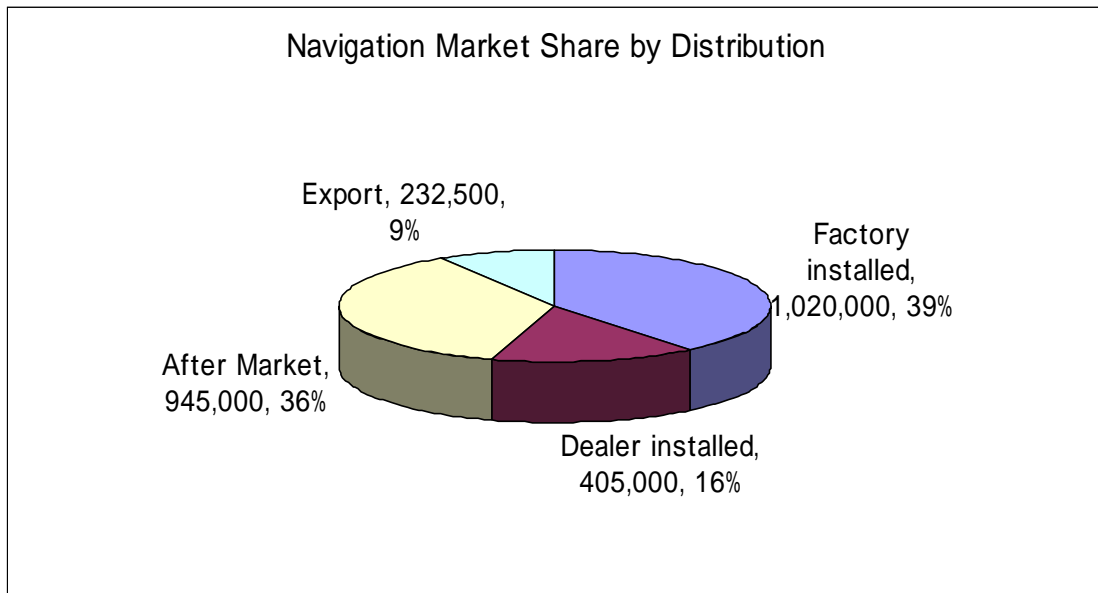
### 3-2, Car Navigation Market in 2002

Navigation Market Share (2002)

Navi ECU	Navi Vendor	After Market	OEM Option		Vender OEM	Over seas		Total	Share
			Dealer installed	Factory installed		Europe	USA		
Aisin AW			40,000	350,000	80,000	25,000	5,000	500,000	19%
	Fujitsu Ten	30,000							
	Alpine	50,000							
Denso			40,000	130,000	275,000		20,000	465,000	18%
	Fujitsu Ten	30,000	70,000						
	Kenwood	70,000	30,000			20,000	5,000		
	Sony	50,000							
HCX					435,500			435,500	17%
	Zanavi		60,000	160,000					
	Clarion	65,000	15,000	130,000		5,000	500		
Pioneer		280,000	70,000			15,000	5,000	370,000	14%
Panasonic		250,000	60,000	20,000		10,000	2,000	342,000	13%
Alpine				150,000		80,000	40,000	270,000	10%
Mitsubishi Electric		40,000	20,000	80,000				140,000	5%
Sanyo Electric		60,000			20,000			80,000	3%
	Kenwood	20,000							
Total		945,000	405,000	1,020,000		155,000	77,500	2,602,500	



### 3-6, Market Shares by Distribution



The biggest market share is Factory-installed Option, next is after-market, Dealer-installed Option and then exports.

The rate of automaker OEM reaches 55% and is growing year by year. On the other hand, the rate of the aftermarket is shrinking.

Pioneer's main market is the after-market. For the sake of keeping the share, Pioneer is forced to introduce a new product every six months in order to win on Dealer-installed Option market.

As to whether the navigation unit's being OEM model or aftermarket model, there is little difference on user demand of the present navigation.

Toyota says that a half the customer buy the car with Factory-installed Option navigation system. Recently the expansive functions which are Back-monitor and Front-monitor have become popular. Also the instrumental panels with navigation system are designed well, which will promote the standardization of that from now on.

On the whole, after market models are superior to OEM models in its function. One of the reasons is that , as has often been pointed out, it takes two years for the development of car,

New model of after market Navigation(December/2002)

Supplier	Brand Name	Storage	Retail Price(¥)	Hardware			Graphics
				Feature	CPU's	Display	
Pioneer	CARROZZERIA HDD Cyber Navi AVIC-V77MD AVIC-V77 AVIC-ZH77MD(2DIN) Aug/2002	HDD10GB or 16GB	318,000	* Faster Calculation than DVD * Precise GPS * Personalization * Landmark rewritable * Wall paper Customize	under 1 second (64bit RISC CPU), Graphical chip	7 inch wide, 32000 colors	Skyview, Twin drivers view
Panasonic	you-navi CN-HDX300D Oct/2002	HDD 16GB	158,000	* All in one & Portable * Detail route guide * Lane Change Guide * Memorize route * Landmark rewritable	* All in one chip (NAVIEM); 64 bit CPU, Graphical chip, 1/OASIC, 3 DGyro, speed sensor	6.5 inch wide, 28000dot TFT	3D lane guide · 3D intersection, Highway entrance guide · satellite map, Virtual city map
Alpine / AisinAW	i-assistNAVI HDD555 July/2002	HDD 16GB	278,000	* Car Portal (mydriveNet.com), Schedule management on Server * Route banking * Cellular Synchronized * Pedestrian navigation by using Cellular	64 bit RISC CPU, GraphicIC, hybrid gyro & accelerated sensor built in	8 inch wide, 32000 colors	Best lane guide, 3D Guidance map, City location, Dual screen
Kenwood/Denso	HDD GIGA SPEED NAVIGATION HDZ2570ITS Oct/2002	HDD 16GB	198,000	* i-mode modem built in * optional Cocosecom tracking system * Skycruise view * 10mscale city map * user customizable * ATOK	All in one High speed CPU NAVIEM; = 64 bit RISC CPU, Graphical chip, GPS, VICS	8 inch wide 336960dot TFT, Touch panel	3D intersection · 3D junction guide, Visual cruising map
FujitsuTen / AisinAW	AVN9902HD Nov/2002	two HDD 20GB (One for Navigation, Another for audio)	328,000	* IKONOS Satellite route guidance * 3000 title Music Bank by HDD * Back monitor camera * Wall paper customizable	64bitBUS RISC CPU, GraphicIC, VGA SIC	6.5 inch wide VGA, 115000dot	Satellite photo route guide, Hyper lane assist, Virtual town map · Real wide map, Junction lane assist
Sony/Denso	NVX-MV8100 Aug/2002	DVD	178,000	* Jogdial * 8 inch wide display * Back camera	64bitBUS RISC CPU, GraphicIC	8 inch wide VGA, 1024 colors, 336960dot	Multi angle polygon map, Flight view compass line, Twin map
Clarion	MAX420VD	DVD	198,000	* 6.5 inch wide display DVD movie * Touch Panel * Automatic parking guide at destination	64bitBUS RISC CPU, GraphicIC	6.5 inch wide, 336960dot	Transparent display, 3D real landscape, World map, Starlight cruise
Mitsubishi Elec	CU-V7000RVP Oct/2002	DVD	178,000	* Java game * windows CE OS * 7inch display, DVD movie	64 bit RISC CPU	7 inch wide, 336960dot	3D intersection zoom up, 3D view map, Twin display
Sanyo	NV-DX850	DVD	139,000	* Portable * 7 inch display * TV, DVD movie		7 inch wide, 336,960 dot	3D city map, Hyper view, 3 route searching

A special feature of the Toyota navigation system is a touch-panel.

European automakers such as BMW have begun using multi-function switches. Bosch and VDO don't adopt the touch-panels. European engineer said that using a touch-panel while driving is dangerous.

Steering switches are used in general European cars; Toyota uses them only in luxury car such as the Celsior. Toyota is to install steering switches in midsize cars in the future.

Voice recognition is being used by connecting optional microphone.

Human interface (HMI)

	Dealer installed			Factory installed	Comments
	2000/5/1	2001/5/1	2002/5/1	2002/5/1	
Operation description voice					
Hint feature					
Demo feature					
Touch panel					
Voice operating system					
Steering switch					Luxury cars and the Caldina. Towards standardization in the future
Voice guides					
Gentle voice					
Anniversary voice					
Safety information greeting					Conveys the post-navigation setup greeting (good morning, good afternoon, good evening) and today's date
arrival					It is X hours and X minutes to your destination. It will cost X yen to your destination.
rest					It has been one hour. You need to rest. (Responds according to personal data such as age and gender)
merge					You are merging. Please be careful.
accident			R&D		There have been many accidents. Please be careful.
railway					There is a railroad crossing. Please be careful.
curve					There is a curve. Please slow down.
lane selection					Please drive in the righthand lane.
district					You have entered Tokyo.
night					It is night. Please turn on your lights.
driving					Thank you. Your driving time was X hours and X minutes.
keep lane					You have touched the lane divider. Please be careful. (lanekeeping)
ACC					Your following distance is short. Please be careful. (ACC)
back					You can back up. (parking assistance)
Image information			R&D		You are approaching an area for which there are images. Please stop if you would like to view them.

## 5-2, Image Processing Technology



Computer graphics technology has been incorporated into the navigation displays. Earlier navigation systems had normal views. Xanavi later developed a bird's-eye view display.

The three development groups are currently doing applications for CG technology navigation systems.

Mitsubishi Corp group: Jicoux data systems/Silicon Graphics/Oracle Japan

Mapcube group: Increment P/Pasco/CAD Center

Zenrin group: Zenrin/Geo Technology Laboratory

This technology can be applied not only to car navigation systems but also to pedestrian navigation, real estate, radio wave analysis, city planning, flood forecast.

To create a CG image, Mitsubishi Corp combines IKONOS satellite images and the building height measured by laser, to create a three-dimensional space and attaches a photo image onto the outside of the building.

Mapcube creates a three-dimensional image by combining the building height measured by laser onto the map and attaches the photo in the same manner. This technology developed by NASA for military purposes.

On the other hand, Zenrin develops to measure the heights practically.

The costs in CG creations is the texturing of the buildings for more realistic displays.



Panasonic was the first to apply this technology.

Panasonic introduced for Mitsubishi Corp for the HDD model

in the spring of 2002. The Tokyo, Nagoya, Osaka, Tomei and Meishin freeways are displayed in CG.

combination of them freely. The navigation system which is the main function, is also one of the contents of portal, as is the testing of car.

User takes out the contents by voice which then presents by voice or display. It is desirable that he uses voice while driving, and uses both display and voice when he stops the car.

For display, touch-panel for GUI is good.

We want such a screen on which a picture comes out from a corner, which is on a level with PlayStation-2.

These are categorized as entertainment, which is a role of B2C of the portals.

B2E, B2B would be built on a link with this system. This linking will make it possible that automobile manufactures use the system together with marketing, CRM, parts procurement, product planning, ERP and groupware or so.

### 6-3, New Telematics Services in 2002

Specification of server base Navigation

Supplier	Brand Name	Map or Storage	Retail Price(¥)	Hardware			Software						
				Feature	MAP Downroad Speed	Display	Center Server	Map.Contents Version Up	Link of PC,Cellular	Mail	Car Audio	DVD Movie	HMI
Pioneer	Airnavi	Wireless	200,000	* I format * built in cdma2001X	20 second	6.5inch	*Map Server *Point of Interest Server * Ecommerce Server	Server		pioneer-mail	None	None	Voice Recognition
Clarion	AutoPC CADIAS WindowsCE	Wireless	338,000	* I format * Windows Automotive OS	60 second	6.5inch	*Map Server *Point of Interest Server	Server		internet-mail	OK	OK	Voice Recognition Touch Panel
Nissan/Zanavi	CarWings	Wireless	48,000	* I format	30 second	1DIN 4.2inch	*Map Server *Point of Interest Server	Server		carwings-mail	None	None	Voice Recognition
Toyota/Panasonic	G-BOOK	SD Card	WillCyPha Standard Equipment 1.2 Million ~	* Windows Automotive OS * Japan map in 2.5 6 MB SD Memory Card * built in cdma2001X	* Simple map installed on SD Card * Point searching 20 second	6.5inch	* Menu Server * User Customize Server * G-Book support Server	SD Card in shop	* via SD Card * Usable from PC,PDA,Cellular	G-book-mail	None	None	Voice Recognition Touch Panel

In 2002, three telematics services enter the market. That is “Carwings” from Nissan, “G-BOOK” from Toyota and “Airnavi” from Pioneer.

These services are built on new telematics architecture.

## Chapter 7, Major Manufacturers

### 7-1, Toyota Motor

#### 7-1-1, Telematics “G-BOOK” service

In October of 2002, the “WiLL CYPHA” entered the market with a telematics G-BOOK unit as standard equipment.

Conventionally, cellular connection telematics services were performed at 9.6 Kbps, but the G-BOOK’s greatest feature was that it had a KDDI-provided cdma2000 1X built-in data communications module that could respond to a maximum 144 Kbps network.

With this high-speed network, the user could utilize the Internet and e-mail with quick response.

The following are features of the G-BOOK service.

- ① Automotive unit configuration: 6.5-inch touch panel display, data communications module and antenna, microphone, GPS, hands-free connector
- ② 256 MB SD memory card as standard equipment. A 50m scale simple map of Japan is stored to the card. Street maps can be obtained through downloading. Destination lookup using phone numbers can be done via the center by connecting to the server.
- ③ Mayday service, stolen vehicle tracking service (charged)
- ④ User customized display: the screen and menu can be changed according to the user’s preference.
- ⑤ Information can be obtained and the destination specified via the Internet.
- ⑥ News and weather reports are read out loud.
- ⑦ AUTOLIVE: karaoke and BGMs can be downloaded and played.
- ⑧ Voice recognition, Internet browser with Text to Speech function, e-mail
- ⑨ P-Way leasing method: the world’s first endeavor to determine the leasing amount based on the monthly mileage sent to the G-BOOK center is utilized. If using 5 years as an example, for someone who drives 100 km / month, it would be 930,000 yen / 5 years, and for someone who drives 800 km / month, it would be 2780,000 yen / 5 years.

## 7-6, Fujitsu Ten

### 7-6-1, Navigation strategy

Currently, they are procuring two navigation models from Denso, and three models from Aisin AW. For the aftermarket, they will utilize a model that can be sold commercially, and will procure a model that connects to the internet from Denso, and for all others they will procure navigation boards from Aisin AW. Commercialization by building into TVs, DVDs, audios and displays is performed at Fujitsu Ten. Both Denso and Aisin AW don't have an AV division, so Fujitsu Ten will handle any part that concerns AV. They get good reputation from market as a provider of a navigation system that has the same level of quality as Toyota OEM product.

### 7-6-2, HDD navigation

To the aftermarket, they will bring a navigation system with the highest HDD specifications, "AVN9902HD," for 375,000 yen.

Two 20GB HDDs will be loaded into this.

As Fujitsu Ten includes IKONOS satellite image data of major cities, a large capacity is necessary.



The 20GB HDD for audio use can store a maximum of 3000 songs. Songs are recorded and automatically made into a library, just by playing the CD. In addition, as 100 images can be stored, they can also be used as wallpaper.

## 7-11, Sony

### 7-11-1, From emphasis on navigation to network and content

They have withdrawn from navigation hardware production in 2001, and have changed to consigning production to Denso.

In the time of CD-ROM navigation, it was only a simple map display, but with DVD navigation it became highly functional with things such as display, search, direction, operation, HMI, AV, vehicle and telematics. The development costs were high, and it found that it had become a money-losing division.

For the commission to Denso, it was decided that Denso would develop with a structure incorporating Sony's signature jog dialing, memory stick hookup and PC hookup. Sony's conventional navigation style is being followed. Toyota's map master is used for the maps.

In return for commissioning navigation to Denso, Denso and Aisin AW are able to use memory sticks. The Fujitsu Ten, Kenwood and Alpine brands, all provided with commercial products by both companies, are now all going to install memory sticks.

In addition, they are jointly developing prepaid commerce on the internet using the Edy card with Denso.

They are taking the achievement of having performed "pod" development with Toyota, and now trying to make it a reality through the joint development with Denso. Sony has steered its business toward network and content for navigational operations.

### 7-11-2, HDD car audio

At the same time as withdrawing from navigation development and production, they are also focusing in on car audio products.

As a new product, the HDD audio library system MEX-1HD was issued. It is priced at 160 thousand yen, approximately three times the cost of the conventional 1DIN audio.

It has the following characteristics.

- ① 2000 songs can be stored as MP3 files in the 10GB HDD.
- ② High-speed CD recording. The Pioneer product records at the playback speed, but Sony's product has a high-speed recording mode.

## 7-12, Pioneer

### 7-12-1, Taking the market with HDD navigation

Despite its high price of over 300 thousand yen, the HDD navigation introduced in spring of 2001 was lauded by its users for its high-speed calculations, high-speed display and HDD audio, expanding its market share significantly.

Share was also widened in the low-price category with the DVD navigation's situation as a widespread product, and its being issued for the low price of 150 thousand yen. They will be taking the market by storm with the navigation aftermarket between spring of 2001 and the end of 2002.

### 7-12-2, Telematics type navigation "AirNavi" and mobile commerce



At the end of 2002, the first aftermarket communication type navigation "AirNavi" put on the market.

For this, a lightweight map software called i format, developed by Pioneer's subsidiary Increment P Corporation, is used.

The map contains a country map in 80MB out of the 128MB flash memory. Display is in normal view only, and other displays such as driver's view are not possible.

As the search can be done using phone numbers, the input is the same as storage type navigation.