



银领工程

高等职业教育技能型紧缺人才培养培训工程系列教材

汽车运用与维修专业领域

汽车实用英语

韩建保 主编



高等教育出版社

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内容简介

本书是高等职业院校汽车检测与维修专业的教学用书。

本书共 27 个单元,涵盖了现代汽车(特别是轿车)大部分系统或总成易出现的故障及其诊断与维修,也包括 2003 年和 2004 年部分世界最新车型的新技术特征及其对汽车维修保养技师的要求,让汽车维修厂能够高效运转的设备布置方案,汽车维修工具的百年发展史,美国汽车维修资格认证协会(ASE)的产生背景、运作模式、考试形式以及试题的编写原则等方面的内容。

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出版说明

为了认真贯彻《国务院关于大力推进职业教育改革与发展的决定》，落实《2003—2007 年教育振兴行动计划》，缓解国内劳动力市场技能型人才紧缺现状，为我国走新型工业化道路服务，自 2001 年 10 月以来，教育部在永州、武汉和无锡连续三次召开全国高等职业教育产学研经验交流会，明确了高等职业教育要“以服务为宗旨，以就业为导向，走产学研结合的发展道路”，同时明确了高等职业教育的主要任务是培养高技能人才。这类人才，既要能动脑，更要能动手，他们既不是白领，也不是蓝领，而是应用型白领，是“银领”。从而为我国高等职业教育的进一步发展指明了方向。

培养目标的变化直接带来了高等职业教育办学宗旨、教学内容与课程体系、教学方法与手段、教学管理等诸多方面的改变。与之相应，也产生了若干值得关注与研究的新课题。对此，我们组织有关高等职业院校进行了多次探讨，并从中遴选出一些较为成熟的成果，组织编写了“银领工程”丛书。本丛书围绕培养符合社会主义市场经济和全面建设小康社会发展要求的“银领”人才的这一宗旨，结合最新的教改成果，反映了最新的职业教育工作思路和发展方向，有益于固化并更好地推广这些经验和成果，很值得广大高等职业院校借鉴。我们的这一想法和做法也得到了教育部领导的肯定，教育部副部长吴启迪专门为首批“银领工程”丛书提笔作序。

我社出版的高等职业教育各专业领域技能型紧缺人才培养培训工程系列教材也将陆续纳入“银领工程”丛书系列。

“银领工程”丛书适用于高等职业学校、高等专科学校、成人高校及本科院校开办的二级职业技术学院、继续教育学院和民办高校使用。

高等教育出版社

2004 年 9 月

前 言

本书是高等职业技术学院汽车检测与维修专业的教学用书。

本书作者近几年为汽车检测与维修高职班讲授汽车专业英语课程,编译了100多篇介绍汽车新技术和汽车检测、故障诊断、维修保养等方面的技术文章,翻译制作了多个车型的维修保养技术资料,并为多家汽车制造厂和汽车维修保养技术信息服务公司的技术人员培训汽车专业英语。根据多年的教学、培训和编译工作经验,以及汽车检测与维修高职毕业生反馈来的实际需求信息,编写了本书。与其他汽车专业英语书籍相比,本书特别关注了以下几个方面的问题:

1. 单词、专业术语短语词汇量的扩充与熟练掌握汽车专业英语的典型语句结构和惯用表达式并重,避免只注重对前者的强调。汽车专业英语翻译工作的经验表明,在翻译工作中遇到的大部分困难并不是由于对单词的不了解,相当一部分都是由于对整个语句或段落的专业表达习惯不熟悉导致的。汽车是一个比较复杂的机电产品,拆卸一些零、部件或分析故障原因的过程本身都比较复杂,但在汽车专业技术英语中,为了避免文字叙述上的繁琐和“不必要的”重复,应用的语句常常会出现“丢三落四”,句子成分不全,内容“跳跃”不连贯的现象。因此,本书在课文的选材和编写形式上,都力图培养同学们根据整段或前后文提供的线索以及“先验的”汽车专业知识,准确把握汽车专业英语技术含义的“潜意识”。

2. 对语法难点的处理,不再采用基础英语教程中对语法现象详细解释的方式,而是针对典型语句给出既尽量准确又不失中文表达习惯的参考译文,再配合教师在课堂的讲解,让同学们理解消化,做到举一反三。如果仍然用较大的篇幅讲解语法现象,显然只是对基础英语教程内容的重复,而且常常会误导同学们的学习重点,削弱对于汽车专业英语中那些富有专业特征的“技能性”语言知识的关注和掌握。通过揣摩课文中注释语句的参考译文能够进一步消化英语语法知识,同时还可以增强同学们阅读翻译时的“联想思维”能力,克服“常感到似乎已经明白了句子的意思,但不能用中文准确完整地表达出来”的心理困境。

3. 课文选材主要源于美国的面向汽车维修保养和检测技师的专业技术杂志“Motor”的 latest 技术报告类文章,基本上没有采用汽车技术通俗读物或科普类的文章。这样的选材原则使得同学们在学习专业英语的同时,还能够了解世界汽车维修行业的最新知识。文章中出现的词汇、专业术语、专业操作的英语语句表达特点和习惯等,都是读者在今后的工作中要面对的。在课堂上学习这些来自于实际的,而不是经过简化的专业技术类文章,有助于提高读者阅读汽车专业英文技术资料的“技能”,并为今后进一步自学,以及阅读和翻译不断更新的汽车技术资料打下坚实的基础。为了对相关主题有一个比较完整的论述,大部分单元都比较长,教师可以根据每个单元

的“教学导读”,在课堂上只需讲解单元的前半部分内容,后半部分留给读者作为课后阅读练习。书中对各种疑难语句的中文参照译文,可作为翻译汽车技术资料时的参考指南。从这个意义上讲,本书也适合作为汽车维修技师翻译英语技术资料时的工具书,汽车检测与维修专业技术人员的培训教材,还可供从事汽车工程、汽车运用工程、汽车维修与检测工作的相关人员参考。

本书共 27 个单元,涵盖了现代汽车(特别是轿车)大部分系统或总成易出现的故障及其诊断与维修,也包括 2003 年和 2004 年部分世界最新车型的新技术特征及其对汽车维修保养技师的要求,让汽车维修厂能够高效运转的设备布置方案,汽车维修工具的百年发展史,美国汽车维修资格认证协会(ASE)的产生背景、运作模式、考试形式以及试题的编写原则等方面的内容。

本书由北京理工大学机械与车辆工程学院韩建保博士主编。上海汇众汽车制造有限公司韩双庆工程师审阅了全稿。

本书在编写过程中得到了《汽车维修与保养》杂志社的李强、范颖和桂江一,北京理工大学机械与车辆工程学院张鲁滨和李邦国等同志的帮助,在此表示衷心的感谢。由于时间仓促,水平有限,书中难免有不妥之处,敬请批评指正。

编 者

2004 年 9 月

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Unit 1 History and Basic Components of Automotives

(第一单元 汽车的历史及其基本组成部件)

教学导读

- 本单元概略介绍了汽车发展史,汽车的主要组成部分及其功能和工作原理。要求掌握汽车各总成的英文名称。
- 重点讲解课文注释中6个句子。掌握描述系统的安装位置和组成部件的句型。建议读者熟读第3、第4和第6个注释语句。

More than a century ago, the first workable four stroke internal combustion (IC) engine was invented in Cologne, Germany, by a young merchant's assistant named Nikolaus Otto. Subsequently, Karl Benz, Gottlieb Daimler and Henry Ford produced the world's first cars with IC engines. By the early twentieth century various practical car design were appearing internationally. This was followed by a great revolution in personal mobility.

Prior to the period in 1886 when Karl Benz patented the first vehicle, most people of the world including Europe and Japan were not able to travel more than 35 km from their homes except under duress to enlist in conquering armies or join groups of religious travelers. In 1893, Henry Ford in Dearborn, Michigan, USA, Placed his first car on the road. In 1901, the Daimler motor company predicted that worldwide car sales would never exceed 1 million because the population at large could not provide more than a million people capable of learning how to drive their vehicle.¹ As can be read from the subsequent paragraph, Daimler grossly underestimated. From this historical standpoint, it becomes interesting to see how the road vehicle has become the great liberator in terms of personal and mass mobility. Early in the Second World War the world vehicle fleet was less than 50 million units, but by 1987 the total unit has grown to approximately 516 million, of which 395 million were passenger cars.²

A typical passenger car of today contains more than 15 000 separate, individual parts that must work together. These parts can be grouped into four major categories: engine, body, chassis and electrical equipment. The engine acts as the power unit located normally at the front of the car, followed

immediately by a clutch, gear box, propeller shaft, universal joint, differential, back axle, ect.³ The internal combustion engine is most common on automobiles. It obtains its power by burning liquid fuel inside the engine cylinder. There are two types of engine: gasoline (also called a spark-ignition engine) and diesel (also called a compression-ignition engine). Both engines are called heat engines. The burning fuel generates heat which causes the gas inside the cylinder to increase its pressure and supply power to rotate a shaft connected to the transmission.

A car body is a sheet metal shell with windows, doors, a hood and a trunk deck built into it. It provides a protective covering for the engine, passengers and cargo. The body is designed to keep passengers safe and comfortable. The body styling provides an attractive, colorful, modern appearance. The chassis is an assembly of those systems that are the major operating parts of a car. It includes the transmission, suspension, steering and brake systems. The transmission system is a speed and power changing device and conveys the drive to the wheels. Its main components comprise the transmission case, input shaft, output shaft, countershaft, driving gear, transmission fork, etc. A common transmission has a gear arrangement of neutral position, reverse gear, first gear, second gear, third gear, etc., where the reverse gear permits a car to reverse its direction.

The suspension system is used to absorb the road shocks and reduce the impact and dynamic loads which are transmitted to the sprung weight. The sprung weight (including body, engine, power train, etc.) is suspended by the front and rear springs. The steering system controls the direction of the car's movement. Two types of steering system are commonly used on cars: manual system and power system. The manual steering system is composed of steering wheel, shaft and column, steering gear and pitman arm, steering knuckles and ball joint, spindle assembly, etc. The power steering system is made up of a hydraulic pump, fluid reservoir, hoses, a power steering gear assembly, etc.⁴ There are several manual steering gears in current use like the rack and pinion type, the worm and tapered pin steering gear, and the worm and roller steering gear.⁵ All power steering systems require a power steering pump attached to the engine. Most late model cars with power steering utilize either a power rack and pinion system, or an integrated power steering gear system.

The brake system slows down the running car. In general, the front brakes of a car are "disc" type, wherein friction pads in a brake caliper are forced against machined surfaces of a rotating disc at each wheel to slow and stop the car. The rear brakes are "drum" type, wherein internal expanding brake shoe assemblies are forced against the machined surface of a rotating drum at each wheel to slow and stop the car. The electrical system supplies electricity for the ignition, horn, lights, power seat and window adjusters, heater and starter. The lights include the headlights, parking lights, direction signal lights, side marker lights, stoplights, backup lights, tail lights, and the interior lights. The in-

terior lights cover the instrumental panel lights, various warning, indicator, and courtesy lights.⁶ The electricity level is maintained by a charging circuit. This circuit consists of the battery and alternator or generator. The battery stores electricity. The alternator changes the engine's mechanical energy into electrical energy and recharges the battery.

New Words

merchant	<i>n.</i> 商人, 贸易商, 店主
mobility	<i>n.</i> 可动性, 流动性, 机动性
duress	<i>n.</i> 强迫, 监禁
enlist	<i>vi.</i> 参军, 入伍
conquer	<i>vt.</i> 征服, 战胜, 占领, 克服(困难等)
fleet	<i>n.</i> 车队, 船队, 舰队
category	<i>n.</i> 种类
chassis	<i>n.</i> 汽车底盘, 飞机机架
countershaft	<i>n.</i> 中间轴, 副轴
universal	<i>adj.</i> 普遍的, 通用的
worm	<i>n.</i> 蜗杆, 螺纹
horn	<i>n.</i> 喇叭

Phrases and Expressions

internal combustion (IC)	内燃机
passenger car	乘用客车, 轿车
transmission fork	变速叉
neutral position	空挡
reverse gear	倒挡
first gear	第一挡
steering gear	转向机
pitman arm	转向臂
steering knuckle	转向节
ball joint	(转向节)球头
spindle assembly	转向轴总成
friction pad	(盘式制动器)摩擦衬块

brake caliper	制动钳
gear arrangement	齿轮排列

Notes to the Text

1. In 1901, the Daimler motor company predicted that worldwide car sales would never exceed 1 million because the population at large could not provide more than a million people capable of learning how to drive their vehicle.

在1901年,戴姆勒汽车公司预测,在世界范围内汽车的销售量是不会超过1百万辆的,因为那时的人口规模不可能提供1百万个能够学会驾驶车辆的人。

2. Early in the Second World War the world vehicle fleet was less than 50 million units, but by 1987 the total unit has grown to approximately 516 million, of which 395 million were passenger cars.

在第二次世界大战的初期,全世界的车辆总数还不足5千万辆,但是到了1987年,全世界车辆的总数已经增加到了大约5亿1千6百万辆,其中3亿9千5百万辆为客车和轿车。

3. The engine acts as the power unit located normally at the front of the car, followed immediately by a clutch, gear box, propeller shaft, universal joint, differential, back axle, ect.

发动机起着动力单元的作用,它一般位于轿车的前部,随其后的为离合器、变速箱、传动轴、万向节、差速器和后桥等。

4. The manual steering system is composed of steering wheel, shaft and column, steering gear and pitman arm, steering knuckles and ball joint, spindle assembly, etc. The power steering system is made up of a hydraulic pump, fluid reservoir, hoses, a power steering gear assembly, etc.

手动转向系统包括方向盘、转向轴和转向柱、转向器(机)、转向摇臂、转向节、转向节球头以及转向轴总成等部件。动力转向系统由液压泵、液体蓄罐、软管、动力转向机总成等组成。

5. There are several manual steering gears in current use like the rack and pinion type, the worm and tapered pin steering gear, and the worm and roller steering gear.

目前(在轿车中)应用的手动转向机有多种形式,如齿轮齿条式、蜗杆锥形销式以及蜗杆滚柱式等。

6. The lights include the headlights, parking lights, direction signal lights, side marker lights, stop-lights, backup lights, tail lights, and the interior lights. The interior lights cover the instrumental panel lights, various warning, indicator, and courtesy lights.

车灯包括前大灯、驻车灯、转向信号灯、侧灯、停车灯、倒车灯、尾灯和车内灯等。其中车内灯包括仪表板灯、各种警示灯、指示灯和门控灯等。

Unit 2 Challenges for Repair Shops from Car's Innovative Features

(第二单元 轿车新技术特征对维修厂的挑战)

教学导读

- 本单元论述轿车新技术对汽车维修业带来的挑战和机遇,用实例说明,汽车专业英语知识对于及时了解新车型的新技术,掌握正确的故障诊断方法和维修步骤的重要性。
- 课文比较长,课堂上可以只讲解前5段,即本田(Honda)新车型的新技术特征。其他部分留作课外阅读材料。
- 描述系统的组成或部件的相互位置时,常应用插图。结合插图的文字解释,了解插图的内容。重点讲解第1~6注释语句,熟悉车型的命名惯例。

Innovative technical features of the new car models of 2003, including a high-capacity CVT (continuously variable transmission), and a W8 engine, promise fresh challenges for independent repair shops.¹ The Honda Accord is such a best-seller that even if it were the only all-new import nameplate for 2003 it would be significant. However, there's a lot more, of course, including the new Mercedes E-Class and CLK, the Saab 9-3, the Mazda 6 and the Subaru Baja. There's also a revival of the Nissan Z, an Altima-based Nissan Murano SUV, plus three Infiniti rear-drive models.² Under the hood are the first W-shaped engine, the W8 from VW in the new Passat, and lots of new engineering in the Jaguar S-Type. Toyota's only new 2003 car Corolla came out in February 2002.³ In this article, let's take a look and see especially what's new with the models for 2003—nameplate by Honda and VW.

Honda

The 2003 Accord has a look somewhere between the Acura RSX and VW Passat, but under the hood it's pure Honda, with a lot that's new for '03 in both the four and V6. The engines were turned around, so the belt-driven accessories are on the passenger's side as shown in Fig. 2-1. Why? Turning the four (which represents about 70% of Honda's sales) puts the exhaust manifold at the rear, shortening the exhaust, which results in faster catalytic converter warmup.⁴ This also smoothes out exhaust flow, which doesn't hurt performance, either. The ignition distributor and timing marks are gone, replaced by a coil-on-plug system. The four now is 2.4 liters, up from 2.3. That may not sound like

much, but it's really a newer engine with chain-driven double-overhead camshafts replacing the timing belt. Honda introduced this engine last year in the CR-V, which first used the 180° engine repositioning. Power is up from 150 to 160 hp, torque from 152 to 161 ft.-lbs., and at lower rpm (4 500 vs. 4 900).⁵

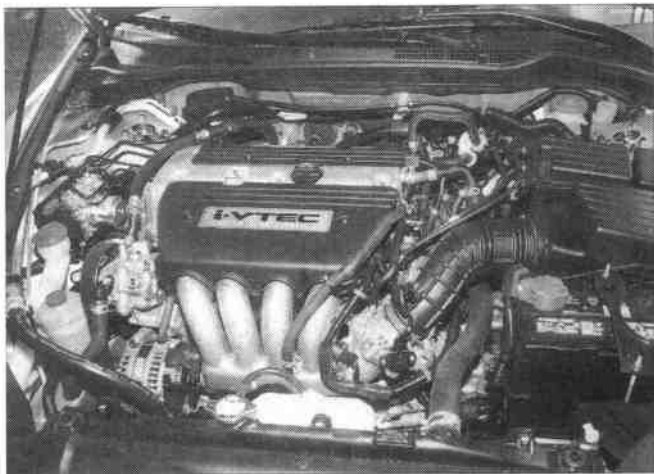


Fig. 2-1 Honda's new 2003 engine is a 2.4 L four that's rotated 180° so the intake is on the front side of the transverse engine and the accessory belt drive is on the passenger side. The distributor is gone.

The electronic/hydraulic engine mount long used by Honda fours and located at the rear now is on the front side, apparently in part because of the engine's 180° rotation. The entire mounting system, however, also was reengineered. As part of Honda's across-the-board improvements in emissions control, however, all four-cylinder engines and the redesigned V6 have the more precise linear air/fuel ratio sensors, not the conventional toggling-voltage type. The V6 still has a timing belt, but the engine has been extensively reworked in other respects, and produces 240 hp, up 40 from 2002 models. It has a three-lobe variable-lift setup on the continuously variable intake camshaft.⁶

The new accord is a "CAN (Controller Area Network)" car as shown in Fig. 2-2. In fact, it has both high-speed and low-speed CANs. The gateway module for both CANs is located in the instrument panel. According to Honda service training, the early report is that OBD II diagnostics will continue to be displayed on generic scan tools.

If you want to take the plunge into gasoline-electric hybrids, the first Honda "mainstream" car is out-the Civic Hybrid.⁷ The electric powertrain is a modified version of the one in the Honda Insight,

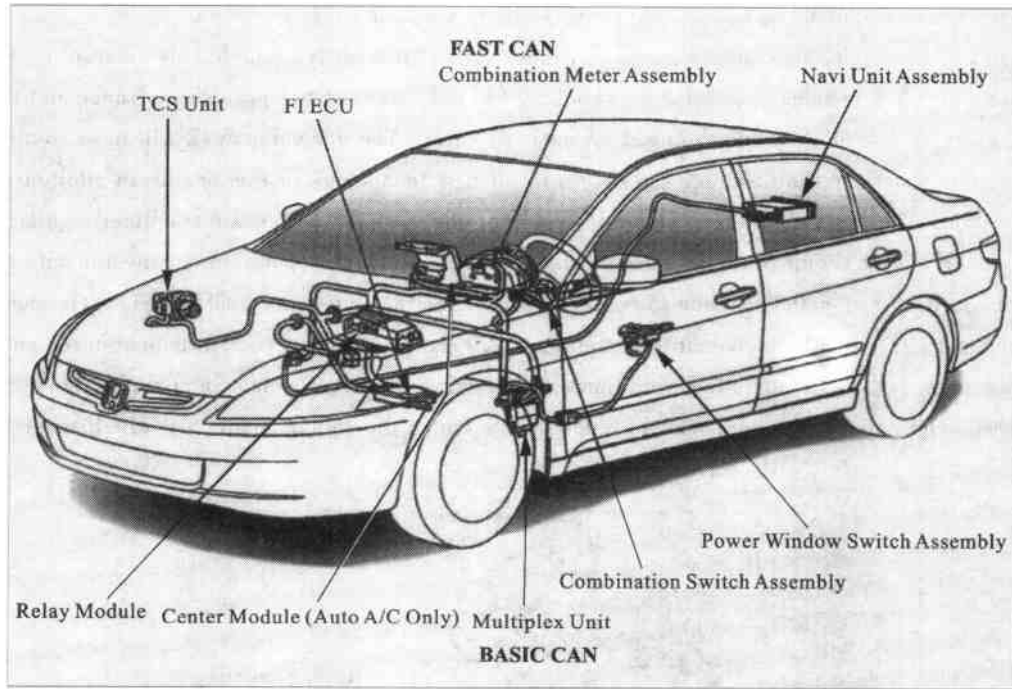


Fig. 2-2 Honda's "fast CAN" network exchanges signals at 500kB/second between the engine/fuel injection computer (FI ECU), traction control computer (TCS ECU), navigation system and gateway module in the instrument panel "combination meter." "Basic CAN" exchanges information at 33.33kB among body control modules.

but the engine is a new 85-hp, 1.3L four-cylinder, compared with the 67-hp, 1.0L three-cylinder in the Insight. Horsepower goes up to 93 on the Civic (73 on the Insight) when the Integrated Motor Assist electric drivetrain comes in. Both Honda hybrids offer a choice of five-speed manual or a CVT, similar to what has been offered on the regular Civic for several years. The Civic Hybrid joins the Toyota Prius as a "real" car.

Volkswagen

The W-shaped engine in the Passat is a first. VW created it by melding two of the narrow-angle, single-head V6s it has had for many years, and eliminating one cylinder per bank row.⁸ The narrow-bank 4.0L (244 cubes) W8 has a cylinder bank angle of 15° in the single head; the angle between the two heads is 72°. So it almost looks like a conventional V8 except for the fact that there are two rows of cylinders on each head. Each double-row bank of cylinders has its own exhaust system through

a primary (close-coupled) catalytic converter, so there are four oxygen sensors.

The 270-hp engine has four valves per cylinder with continuously variable valve control on the intake camshaft. The exhaust camshafts are variable, but only between two positions-advance and retard. That's good enough to eliminate the need for an EGR valve. The upcoming W12 will have continuously variable exhaust camshaft timing. There's a lot of new technology in this engine in addition to the configuration. The cooling system is electronically controlled, as the powertrain computer regulates current flow to a heater circuit in the thermostat valve. Actual thermostat operation is conventional, even if it's not based on wax pellet reaction to engine coolant (see the illustration in Fig. 2-3). The computer heats the stat, based on both coolant temperature sensor signals of actual coolant temperature, and software that uses the engine operating conditions to determine what the coolant temperature should present. Removing a defective thermostat is tough; it's under the intake manifold, which must be removed.⁹

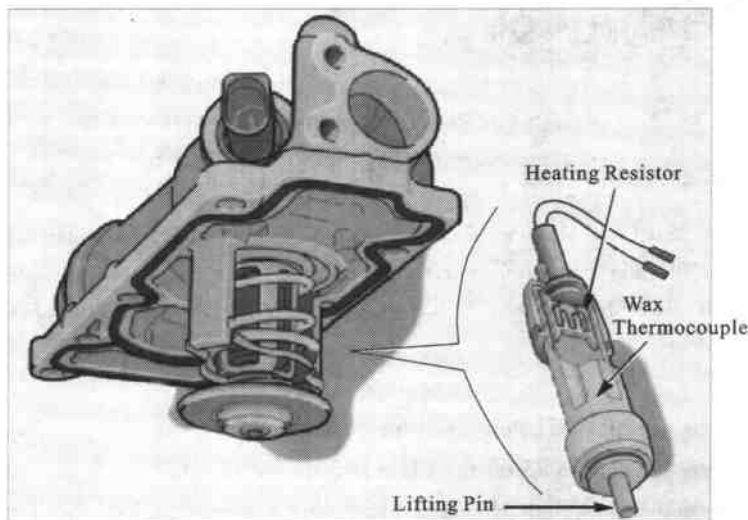


Fig. 2-3 An electronically controlled cooling system thermostat on VW's W8 engine is opened and allowed to close by computer, which can operate a thermostat heater.

Nissan/Infiniti

Nissan and Infiniti are getting wide use of the 3.5 L V6, produced in various stages of tune from 240 to 287 hp. You'll find it in every transverse front-drive from the Altima to the Maxima to the Infiniti I35. For 2003, it's been reworked for rear-drive, so you'll also see it in the 350Z sports car and

the new G35 sports sedan and sports coupe.

You may notice a pair of underhood decals on the new rear-drives. The one on the V6 warns against the common practice of pulling the dipstick while adding engine oil. Reason: The oil dipstick is in one of the oil drainback channels, very close to the oil fill neck of the No. 2 (driver's side) cylinder head as shown in Fig. 2- 4. If there's residual crankcase pressure after engine shutdown, pulling the stick with the fill cap off could result in oil burping out of the dipstick tube, creating a mess.



Fig. 2- 4 Notice that the engine oil fill is very close to the dipstick on this 3.5 L V6 in the Infiniti G35. Near the oil fill there is a label that warns against pulling out the dipstick ("oil level gauge") while adding oil.

The new Nissan Murano has a number of clever interior features, but the most interesting technical development is a CVT (continuously variable transmission) that can transfer the torque of a 240-hp, 246-ft. -lbs. version of the 3.5 V6. The 3.5 V6 is the highest output engine ever to be mated to a CVT, yet it's a very conventional looking gearbox of its type.¹⁰

New Words

innovative	<i>adj.</i> 创新的, 革新的
feature	<i>n.</i> 技术特征, 特色; 相貌特征
model	<i>n.</i> 车型, 样式, 模型
shop	<i>n.</i> 汽车维修厂, 修理厂, 车间
nameplate	<i>n.</i> 名牌, 铭牌(指标有商品厂家名字的牌子)