军事高科技英语教程

Military Hi-tech English Course

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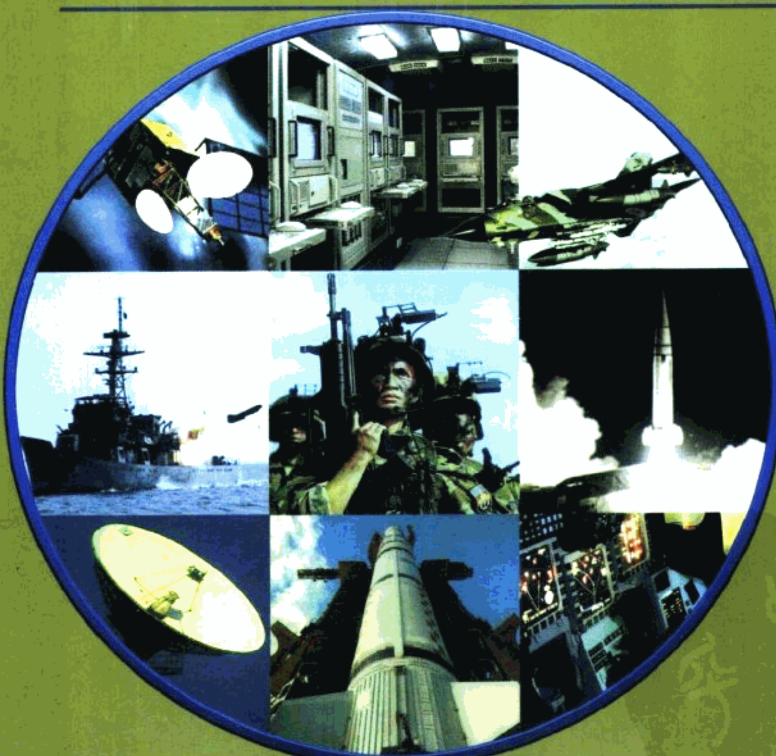

国防工业出版社

前　言

海湾战争的炮火和科索沃的硝烟已经使人们越来越清楚地认识到军事高科技在现代及未来战争中所发挥的巨大作用。中央军委和全军院校十分重视我军高科技的建设和发展。军校所培养的大学生是我军高科技的掌握者和使用者。培养懂得军事高科技的人才对军队和国防建设具有重要意义。而对军事高科技英语文献的阅读是了解当今世界高科技前沿的有效途径之一。

本教程共10个单元,内容涉及当今西方军事高科技的主要方面,包括高科技军事侦察(如卫星和雷达的侦察、预警、监视等);军事通信(包括先进的有线/无线通信、卫星通信、网络安全等);C^4I系统(如北约的C^4I系统、美英等国海陆空军的C^4I或C^3I系统等);电子对抗(如无线电电子对抗、雷达对抗、制导对抗、导航对抗、遥感遥测对抗以及光电子对抗、声学对抗、计算机病毒对抗等);导弹技术(如当今先进的战略巡航导弹、战术导弹、精确制导导弹等);空军兵器(包括先进的轰炸机、战斗机、攻击直升机等),海军兵器(包括核动力航空母舰、核潜艇、驱逐舰、声呐、水下定位攻击系统等);陆军兵器(包括先进的坦克、大炮、装甲车、数字化步兵等);核生化武器。此外还有军事高科技技术的发展及其在未来战争中的作用等内容。

各单元按内容编排,每个单元配有6篇长度为1500左右词汇的阅读文章,每篇文章配有5个口语问题、5个选择题和5个翻译题,对于超出大学英语六级词汇的生词均配有中文翻译。课文均选自较新的英语原文,词汇丰富,语言流畅。本教程不仅可以使读者了解西方当代的军事高科技,而且还能提高英语水平。

本教程作为军校大学生的高级英语阅读教材,既适合通过大学英语四级和六级考试的本科生使用,又适合军队干部培训班的学员使用,也适合军校的硕士生和博士生使用。

在本书的编写过程中我们得到了解放军信息工程大学、信息安全学院领导的大力支持,信息技术研究所的傅敏同志为本书的文字录入做了大量的工作,我们一并表示衷心的感谢。

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于解放军信息工程大学红楼
2001年6月

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Unit 1 Electronic Reconnaissance

Passage 1 The Eyes of the Night

An ability to act covertly is normally the key to special forces' operational successes and those operations carried out in the glare of publicity are more likely to be deemed as the failures.

The skills required for most special forces work involve insertion and extraction of, generally, small patrols, without the notice of local populations in the areas of operation. Between infiltration and exfiltration these teams are usually required to observe and report details of military movements, terrorist activities and to identify targets for the attention of conventional forces while they themselves remain invisible.

The tools used by such teams are relatively few, principal of these being the so-called Mark 1 eyeball, assisted, mainly, by orthodox optical aids such as binoculars. This situation pertained until the 1960s, at which stage optical and electronic technologies combined to produce a new range of instruments which provided, for the first time, a capability for man to see during the hours of darkness, the night-vision systems.

Night-vision systems can be divided into two categories: those depending upon the reception and processing of energy reflected by an object and, secondly, those which operate with energy internally generated by a source. If, indeed, there is no light, and if a body under observation is at ambient temperature, then passive night-vision system is ineffective. To "see" under these circumstances, we must use an active night-vision system. In an active system, the object under observation must be illuminated with some form of energy. This illumination may be visible to the unaided eyes of the observer, such as a magnesium flare or klieg light, or it may illume using a form of energy undetectable to the human eye, such as infrared (IR) or laser energy, or even the ultrasonic squeal of a bat, truly the primordial night-vision systems.

All objects not at absolute zero emit electromagnetic (EM) energy. The higher the temperature of an object, the shorter the mean wavelength of this radiation. The near-IR extends from 0.8 to 3 micron; mid-IR from 3 to 30 micron; and far-IR in the 30 to 100 micron range. In broad temperature terms, objects in the 2,000 to 4,000 K region produce appreciable output in the near-IR; objects below 2,000 K to a few 100 K in the mid-IR (with room temperature about 10 micron); and objects still cooler emit in the far-IR and microwave region. The visible spectrum, generally defined as extending from 3,900 – 7,700Å (Angstrom), is the only portion of the EM spectrum that can be viewed with unaided human eye.

Active infrared systems, depending on illumination invisible to the naked eye, had been militarily exploited during World War II and had resulted in the famed "Sniper-scope" weapons sights, but its active nature ruled against its extensive use. Later developments, however, particularly in the field of infrared sensitive materials, had made possible the fabrication of detectors which, like photoelectric cells, emitted electrons as radiation impacted upon them. This effect was utilized in the production of image intensifiers that effectively transformed the invisible radiation into visible light. The essential element was that they were of passive character, and since they were non-transmitting, were not themselves readily detectable.

Intensifiers make use of the near infrared band, spanning the spectrum from below 1 micron up to 2 microns. The output of natural illumination sources, including moon and starlight as well as artificial entities, contains a proportion of infrared as well as visible light and this is reflected to a greater or lesser extent by vegetation, animal life forms and by artificial constructions, rendering them visible through image intensification devices.

First-generation image intensifiers made use of the photoemission effect displayed by a range of material compounds such as silver, cesium, sodium and antimony. Radiation from the scene under surveillance was optically focused onto photo-cathodes comprised of such compounds, electrons from which were released and accelerated across an evacuated tube under the influence of relatively low applied voltages (12 to 15V) which imparted further energy. This was converted into visible light upon impacting on a cadmium-coated anode at the tube's far end. This fluorescence provided a viewable picture of the subject scenario.

A single stage of amplification, however, was normally insufficient to provide a suitably bright enough picture for practical purposes, and generally a multiple stage amplification or cascade technique was required in order to provide electron gain factors of up to 50 times. Normally three amplification tubes, in series configuration, were required to produce a recognizably bright picture. Such intensifiers, although satisfactory for many purposes, had limitations. Electronic noise factors resulting from series amplification were rather high. And image quality thus left something to be desired. The cascade tube systems were also heavy and bulky, these characteristics stemming from the use of multiple amplification stages and the means of integrating these.

From Flare-Up to Wipe-Out

The cascade tube also suffered from "bloom" or "flare-up" due to electronic saturation when subjected to bright illumination such as the glare from pyrotechnic flares or vehicle headlamps. The brightness of the image caused dazzle and "wipe-out" of the surveyed scene. Possibly of greater seriousness, unless measures were taken to prevent it, the resultant glow could illuminate the user's face——an undesirable feature in situations where concealment is of the essence. The latter problem could be overcome, though, by use of a flexible, shaped eyepiece which remained closed until the user's eye socket was pressed closely against it.

Second-generation intensifiers use a phenomenon known as secondary emission. Although the general principle was similar to that applied in the cascade tube systems, amplification took place in tubes fabricated from semiconductor glass or, alternatively, tubes lined with semiconducting materials.

Secondary emission occurs as electrons accelerated across the tube strike its walls, stripping from these more electrons which are themselves accelerated towards the anode. These electrons too cause further secondary emissions during their travel and the phosphor display is heavily bombarded at high energy levels. Gain across the tube is sufficient to produce a bright and usable image in a single amplification stage and depends only upon the electrical potential applied. The result is a tube of shorter length, lower mass, and productive of less electronic noise, along with no flare-up problems.

Channel tube intensifiers do not suffer from flare-up, which on occasion has been known to destroy parts of the phosphor screen leaving a blindness hole. The gases produced by coating evaporation also cause electron beam spread and the tube thus deteriorates performance-wise. Channel plate tubes offer better resolution than cascade-type units, however, and have greater noise-to-signal ratios, especially at the lower light levels. So in certain tactical situations the cascade systems, which have somewhat better range performance than channel plate tubes, may thus be preferable, especially where observation over extended distances is required.

The other main disadvantage of channel plate systems is that they are generally the more costly. But this factor has been addressed by so-called third-generation systems which are similar in construction to second-generation tubes but which use photo-cathodes comprised of gallium arsenide semiconductor material, which has vastly increased sensitivity. The result is a unit that provides the higher range performance of first-generation systems with the low size and weight characteristics of second generation. Initially, these intensifiers were somewhat more costly than their predecessors were, but this differential has been almost eliminated as manufacturing experience has been gained.

Size and weight reductions have made possible the encapsulation of all components in robust alloys, and the interfaces have become integral with the bodies of weapon sights, rendering the systems more shock resistant.

Whereas image intensifiers are perfectly adequate for some tactical purposes, when there is at least some faint ambient starlight available, there is no question that thermal imagers are a preferable option since they require no light whatsoever for operation. These systems make use of the middle and far infrared bands in which there are two transmission "windows" at 3 to 5 microns and 8 to 13 microns respectively.

Thermal imagers are heavier, bulkier, more complex and resultantly more expensive than image intensifiers, and many require independent means of cooling of their heat-sensitive elements. Generally, this takes the form of bottled compressed gases or purified air, which may create logistical problems. This applies almost exclusively to the 8-to 13-micron systems and may preclude their use for prolonged operations in which no recharging facilities can reasonably be made available. There is also the possible additional hazard created by explosion if one of these high-pressure charged cylinders were to be hit by a bullet or ordnance splinter. Furthermore, the cooled equipment is larger and less easily concealed.

Unlike image intensifiers, thermal imagers can operate under somewhat more extreme conditions by enabling their users to "see" through haze, dust and smoke and to effectively "penetrate" camouflage and foliage. They may be affected by adverse weather, particularly by rain, thick mist, fog and other moist atmospheres, although their performance in such meteorological environments does not fall off as rapidly as that of an image intensifier under the same circumstances.

Which Waveband?

There has been considerable debate over the comparative effectiveness of the 3-to 5-micron and 8-to 13-micron systems with the latter being initially regarded as superior in damp atmospheres, although this claim has not always held true. The 3-to 5-micron systems have the distinct benefit of not needing external cooling, since the sensor elements can be cooled using electro-thermal Peltier techniques, which effectively reproduce the converse effect of a simple thermocouple.

While the 8-to 13-micron protagonists can point to occasions in thick fog in which the rival systems have failed to operate, the author can attest to successful use of a 3-to 5-micron imager in conditions, which were theoretically impossible. The rules do not, despite the strictures of physicists, appear to be hard and fast. Whereas 3-to 5-micron radiation is less affected by ambient atmospheric temperature variations, it is more readily scattered by smoke and mist, dawn to dusk being the worst times for this effect according to one expert. However, the same authority notes that "it's like drawing a veil over the image between 4 and 7 PM in some Mediterranean areas" when using 8-to 13-microns.

The debate over the merits of the differing system types looks set to continue, although there is now grudging acceptance on the part of 8-to 13-micron proponents that 3-to 5-micron systems are certainly not as black as the former had painted them in the early years of thermal imaging development. The lack of resolution of the arguments, however, leaves potential users in a quandary to which the only answer must be that experience should be applied when planning operations. Clearly what is right for some environmental conditions is wrong for others, and temperature-regimes anticipated is vital, as is knowledge of the performance of different systems within those regimes..

There now seems little doubt that the thermal imager is a superior special operations tool to the image intensifier, and generally justifies the additional investment required for its acquisition. Thermal imagers not only have day/night, haze/smoke capability but they can also be used to discover temperature-related information that the intensifiers cannot. For example, hot tyres or engine compartments, seen easily with an imager, indicate that the vehicle has been recently used or that its engine has been warmed up in anticipation of its imminent use.

Hot objects also leave a thermal print of their presence for some time after their removal, this time depending on the temperatures of the object and the ambient. The imprint of a living human body on the ground may well remain for some minutes and may be a telling clue as to hostile "lie-up" positions when a patrol is in pursuit. In counteraction against urban terrorism, imagers also have their special uses. For instance, the heat generated by human activities may indicate which apartment in a block is actually occupied. Also, the heat of weapon flash may remain at a window of door for seconds after the firer of the weapon has quickly returned to concealment. There are many occasions on which an imager, with its ability to resolve temperature differentials of less than 1 degree C, is of what may be termed "forensic" value in military operations.

Thermal imagers, were initially regarded as delicate instruments that require care in handling and this remains true, especially in the case of their lenses, often made of soft germanium material that is easily scratched. But given reasonable respect they are certainly rugged enough for field use and have been applied to sighting applications on, for example, 50 calibre machine guns. This would seem more than sufficient for most special forces' roles.

Few would be so temerarious as to dictate precisely which equipment should be used for which job, these selections only being practically applied by the men on the ground. When entering unfriendly territory, it is necessary to consider the means of infiltration, transport limitations, food and ammunition supplies and the additional kit required to fulfil the role and to survive. Yet when it is considered that a special forces primary role is that of observation, it makes sense to accept that any equipment that assists in this task——or even renders it possible——is of fundamental importance. For this reason it would seem that the thermal imager, irrespective of its shortcomings in logistic, size, weight and cost terms, has an edge over the image intensifier. This may well confer a similar edge on the effectiveness of the user force.

New Words and Expressions

active *adj*. 有源的
ammunition *n*. 军火,弹药
anode *n*. 阳极
antimony *n*. 锑
binocular *n*. 双筒望远镜
cesium *n*. 铯
cadmium *n*. 镉
calibre *n*. 口径
camouflage *n*. 伪装
cascade *n*. 级联
cathode *n*. 阴极
covertly *adv*. 秘密地
dazzle *v*. 眩目
eyepiece *n*. 目镜
evacuated *adj*. 真空的,抽空的
flare-up *n*. 闪光
foliage *n*. 叶子(总称)
forensic *adj*. 法庭的
gallium arsenide *n*. 砷化镓
germanium *n*. 锗
grudging *adj*. 勉强的
imminent *adj*. 危急的
impinge *v*. 落到,射到,碰撞
infiltration *n*. 潜入,渗透,侵袭
infrared *adj*. 红外的
kit *n*. 成套的工具
logistical *adj*. 后勤的
passive *adj*. 无源的
pertain *v*. 属于,关于
photoemission *n*. 光电子放射
primordial *adj*. 原始的,最初的,基本的
pyrotechnic *adj*. 烟火信号的
quandary *n*. 忧郁不决,困境
regime *n*. 状况,体系
scenario *n*. 情况,概要
sodium *n*. 钠

splinter *n*. 裂片，碎片
strip *v*. 获取,剥去
sight *n*. 瞄准器,观测器
temerarious *adj*. 鲁莽的
thermocouple *n*. 热电耦

Exercises

I. Answer the following questions.

1. What are the tasks of most special forces?
2. What tools can now be used by special forces?
3. What is the operational principle of the first generation image intensifiers?
4. What are the main differences between the first, second and third generation intensifiers?
5. What are the features of thermal imagers?

II. Choose the best answers.

1. The most original image intensifiers ________.
   a. are active detectors
   b. can convert visible light into invisible radiation
   c. use infrared sensitive material to transmit electromagnetic waves
   d. are passive in nature
2. The first-generation image intensifiers ________.
   a. have multiple amplification stages to obtain higher gain and lower noise
   b. employ photo-cathodes which comprise some material with photo-emission effect
   c. change visible lights into invisible electron emission at the anode of the tube
   d. use one amplification tube which has a cathode and a anode
3. The second-generation image intensifiers ________.
   a. use multiple amplification stages
   b. employ second emission phenomenon with tubes having semiconductor materials
   c. use photo-cathodes composed of a semiconductor material named gallium arsenide
   d. are bulky, heavy and costly
4. Thermal imagers ________.
   a. are preferable when ambient light is relatively strong
   b. are bigger, heavier, and easy to operate
   c. can be used in any long time operation
   d. can penetrate slightly wet atmosphere
5. The waveband 3-to 5-micron system ________.
   a. is more effective than 8-to 13-micron system
   b. sometimes needs to be cooled externally
   c. is less affected by smoke
   d. is not as ineffective as the 8-to 13-micron proponents initially described

III. Translate the following sentences into Chinese.

1. Between infiltration and exfiltration these teams are usually required to observe and report details of military movements, terrorist activities and to identify targets for the attention of conventional forces while they themselves remain invisible.
2. Later developments, however, particularly in the field of infrared sensitive materials, had made possible the fabrication of detectors which, like photo-electric cells, emitted electrons as radiation impacted upon them.
3. Secondary emission occurs as electrons accelerated across the tube strike its walls, stripping from these more electrons which are themselves accelerated towards the anode.
4. Radiation from the scene under surveillance was optically focused onto photo-cathodes comprised of such compounds, electrons from which were released and accelerated across an evacuated tube under the influence of relatively low applied voltages (12 to 15V) which imparted further energy.
5. The lack of resolution of the arguments, however, leaves potential users in a quandary to which the only answer must be that experience should be applied when planning operations.

Passage 2 High-tech "Eyes" for Flying Spies

When a film-making team visited the Radioplane Company——an early American manufacturer of Unmanned Air Vehicles (UAV)-during the Second World War, their eyes were caught by an attractive young woman working at the plant. The resulting screen debut of Norma Jean Baker in the documentary film they were making helped to launch her subsequent spectacular career under the name Marilyn Monroe.

While those early UAVs can be said to have "launched" one of history's most famous actresses, today's UAVs take to the skies to launch a more prosaic payload-sensors able to detect military targets and threats. This article will review the different sensor types currently available.

The simplest image-recording sensor remains the traditional film-camera. Given adequate meteorological conditions, these produce high-resolution images of superb quality. However, the need to wait until the UAV had returned to base and its film been developed delayed the availability of imagery.

Film can also be used as the recording medium of infrared sensors. Some infrared sensors such as the Vinten Vigil infrared linescan sensor could record their output onto videotape. This eliminated film-processing delays, allowing image analysis to begin soon after the UAV had returned to base. Photographic film is used by many in-service UAVs.

However, film-based sensors are being supplemented and in many cases supplanted by television, low-level television and forward-looking infra-red (FLIR) cameras. Using a flir rather than a television system has the advantage of allowing day and night operation. Television and flir sensors allow a drone to provide real-time imagery to commanders on the ground, but require some form of datalink. The latter can also handle the data from other sensors such as the infrared linescanners or radars.

A datalink will almost certainly use direct line-of-sight radio, limiting the range at which the drone can be used, It will probably use encryption to prevent an enemy from eavesdropping on the information coming from the drone or interfering with the commands being sent. Creating a jam-resistant, secure communications link suitable for UAVs is not easy. The system developed for the unsuccessful Lockheed Aquila in the 1980s lowered video quality to the point where the system's targeting capability was degraded.

If television or infrared imagers can provide real-time imagery and be steered by a ground-based controller, the next obvious step is to add a laser designator to mark targets for attack-typical task for tactical UAVs.

Laser designation is now being seen as a role for longer-endurance UAVs. During a visit to Peterson Air Force Base, Colorado in June 1999, Whit Peters, acting secretary of the US Air Force, revealed the existence of a classified program in which a laser designator had been retrofitted to a Predator so that this long-endurance UAV could mark targets for NATO operations over Kosovo, putting a Raytheon laser designator on a Predator "allowed us to put manned aircraft above the clouds and unmanned aircraft below the clouds," said Peters. "We didn't actually use it in Kosovo, but we did test it stateside and had it ready to go." However, one source told the author that the system was used operationally, though it probably never used the planned below-the-cloud designation for higher-flying strike aircraft.

The Predator entered service equipped with an electro-optical/infrared payload, but was later equipped with a Northrop Grumman AN/ZPQ-1 Tactical Endurance Synthetic Aperture Radar (Tesar). Weighing 75kg, it consists of an antenna assembly with single-axis electronic scanning and two-axis mechanical gimbals, a combined receiver/exciter/transmitter and a commercial off-the-shelf processor unit. The Tesar operates in the Ku-band, and offers SAR and MTI modes. It became operational in March 1996. At the Paris Air Show earlier this year, Northrop Grumman announced that it had been given a $38.2 million contract from the US Army's Communications and Electronics Command to supply a further 34 Tesar radars to supplement the 26 already delivered.

Only the lightest UAVs carry a single sensor. Most are fitted with a combination of sensors, and the spherical housing often used to carry integrated electro-optical hardware is a common sight under the fuselage of many medium-weight airframes.

A good example of a combined IR/EO payload is the system carried by the Outrider. This incorporates a flir and a color television camera, plus all the electronics needed to operate the sensors, gimbals and payload data processor. The infrared sensor is based on a 320 × 240 element platinum silicide array with a micro-scanner mechanism, and operates in the 3-to 5-micron range. It offers two fields of view ($4° \times 3°$ and $12.7° \times 9.5°$). The television camera has a 10:1 zoom lens offering horizontal coverage from 2.4° to 24°. Focus and zoom are controlled via the data link.

In order to demonstrate the technical feasibility for a stealth drone to carry out strike missions, the Darpa (Defense advanced research projects agency) began the Unmanned Combat Air Vehicle

(UCAV) Advanced Technology Demonstration (ATD) program, The UCAV is being designed to deal with threats anticipated for 2010.

On 24 March 1999, the Darpa and the US Air Force selected Boeing to design, fabricate and flight test their UCAV demonstrator in a 42-month, $131 million cost-shared effort. Boeing's tailless, stealthy air vehicle will use real-time on-board and off-board sensors to quickly detect, identify and locate both fixed, relocatable, and mobile targets. It will carry multiple advanced, precision-guided munitions and use secure communications and advanced cognitive decision aids to provide a ground-based human operator with the situational awareness and positive air vehicle control necessary to authorize munitions release. It will also relay battlefield damage indication back to the mission control system.

Vaisala is developing a radio activity reconnaissance payload, Like the detection of chemical and biological agents, this is a role for which unmanned platforms are useful. In America, the Joint Service Lightweight Standoff Chemical Agent Detector (JSLSCAD) has been developed as a Payload for craft such as the Pioneer, and is installed in place of the normal flir and a day /night camera payload. The LSCAD payload would warn ground forces of the position of any NBC agents in their tactical area.

The possibility that US forces or those of their allies may one day face an adversary armed with nuclear, biological and chemical (NBC) weapons has resulted in programs intended to create the technology needed to identify, characterize and attack NBC research, production, storage and operational support facilities. The latter could be above ground, underground, or hidden in tunnels, and could be protected by substantial hardening. During FY 1990, the Department of Defense hopes to complete the integration of a payload for WMD target characterization and bomb-damage assessment (BDA). Project P539 began in FY95 and includes work on ground and UAV-based advanced sensor systems.

No nation has invested more heavily in the development of datalinks for UAVs than the United States, Under the Common Data Link (CDL) and newer Tactical Common Data Link (TCDL) programs, lightweight standardized wideband, digital, secure datalinks have been developed for use on UAVs, or even on manned aircraft. Intended to allow the air-to-surface transmission of radar, video and other sensor data information over ranges of up to 200km TCDL will operate at data rates of up to 45Mbps while retaining the 10.71Mbps return link and 200kbps command link rates of the existing CDL hardware in order to maintain interoperability with the older system.

As range increases, so do the problems of maintaining a real-time data link. The US Army solution to this problem is to fit some UAVs with the Airborne Data Relay (ADR) payload, a relay device which can extend mission range by up to 75 km. This hardware can be installed in place of, or in addition to, the normal modular mission payload(MMP). If both are carried, they can be used simultaneously during the mission. ADR has two directional antennas, transmitters and receivers and control circuits. When activated, it maintains a two-way link between the GCS and another UAV carrying a sensor payload. Using one drone to act as a relay for another is a practical solution but increases operating costs and the risk of mission failure because more than one aircraft must be airborne and operating.

For armed forces who have spacecraft available, satellite communications provides datalink capabilities over ranges of hundreds of kilometers or even over intercontinental distances. The Predator Medium Altitude Endurance (also known as Tier Ⅱ) uses a traditional line-of-sight datalink for take off and landing, but switches to a Ku-band, 1.5 Mbps satellite communications systems which is usable over Predator's full operational range of more than 900 km.

By the time of its second deployment to Bosnia, the Predator was hooked into an international data-distribution network the speed and complexity of which would have seemed like science fiction a few years ago: a Ku-hand satcom link maintained the flow of data from the Predator operating site at Taszar in Hungary. From here motion video and narration was passed via a Very Small Aperture Terminal (VSAT) communications satellite to the Joint Analysis Center (JAC) at Molesworth in Britain, from where they went via a transAtlantic fibre-optic cable to the United States, where it was relayed via a Joint Broadcast System (JBS) satellite to end users.

In the USA, these included the Joint Information Management Center (JIMC) in the Pentagon, the Defense Intelligence Agency, and the National Security Agency. Destinations in Western Europe included the Shape in Belgium and USAFE in Germany and the military assets directly involved with operations over the former Yugoslavia. The latter included the Combined Air Operations Center at Vicenza (CAOC) in Italy, British, French, and US Navy ships operating in the Adriatic. Still images and reports flowed via Intelsat to reach the SIPRNET (Secret Information Internet Profile Routing Network) and JWICS (Joint World-wide Intelligence Communications System), which distributed the data to the CAOC and the NORAD Cheyenne Mountain Complex (NCMC).

From the CAOC at Vicenza, imagery could be sent by landline to Aviano in NorthEast, then transmitted via a modified Maverick datalink directly to the rear cockpit of F-15Es or multifunction display in an F/A - 18. Fighters operating over the former Yugoslavia could thus obtain near real-time images of what the Predator was observing. At first they received full-motion video, and the total delay between the image and the real-time event was only 1.5 seconds. In practice, it was found that aircrew preferred a freeze-frame image updated every few seconds. The images would show them the exact appearance of the target as they began their attack. And a battle-damage assessment within a few seconds of the weapons exploding on target.

This capability was available during the NATO air campaign over Kosovo, but had been in use over Bosnia several years earlier. Yet despite this clear evidence, some nations are proving slow to perceive the usefulness of this sort of UAV-based sensor-to-shooter capability. The target date for the entry into service of the United Kingdom's proposed Spectator formation-level 150 kilometer range drone with day and night all-weather sensors is 2008, the same as that of the planned Extender 45000 foot cruising altitude communications relay. A proposed Sender unit-level 30-kilometre range 4000-foot altitude reconnaissance drone altitude reconnaissance drone could be in service sooner, but this will be usable only under VFR (visual flight rules) conditions. The best UAV and armed forces have the vision to exploit the capabilities these systems have to offer.

New Words and Expressions

adversary *n*. 对手，敌手
airframe *n*.（飞机）机架，导弹弹体
bay *n*. 机架，支座，底板
cognitive *adj*. 认识的
drone *n*. 无人驾驶飞机，翁翁声
eavesdropping *n*. 窃听
encryption *n*. 加密
FLIR (forward looking infrared) 前向红外
fuselage *n*. 机身，弹体，外壳
gimbal *n*. 万向接头，平衡环
interoperability *n*. 互用性
line-of-sight *adj*. 视距内的
munition *n*. 军需品（尤指枪炮，弹药），军火
non-line-of-sight *adj*. 非视距内的
payload *n*. 有效负荷
platinum *n*. 铂，白金
procurement *n*. 获得，获得的条件
prosaic *adj*. 平凡的，乏味的，散文的
reconnaissance *n*. 侦察
retrofit *v*. 更新，改型
satcom *n*. 卫星通信
stealth *n*. 暗中，隐形
supplant *n*. 取代
tactical *adj*. 战术的，作战的
zoom lens 可变焦距透镜

Exercises

I. Answer the following questions.

1. What "eyes" for flying spies are mentioned in this article?
2. What does Tesar made up of?
3. Do most UAVs carry multi-sensors? Give an example.
4. What are the payload and programs related to NBC-weapon-detecting?
5. How to maintain a real-time data link as range increases?

II. Choose the best answer.

1. UAVs are aircraft __________.
   a. that carries actresses
   b. that can carry target-detecting sensors
   c. that was made during WW II
   d. that is mainly discussed here
2. Of all the sensors on board UAVs __________.
   a. flir is the simplest one
   b. only TV and flir sensors require some form of data-link
   c. the laser designator can mark targets
   d. the film-camera can provide day and night operation
3. Boeing's tailless and stealthy air vehicles will __________.
   a. only use on-board sensors

b. guide the surface human operator to shoot munitions precisely

c. relay damage indication information back to the mission control system

d. not use encrypted communications

4. Which is the program related to the datalink development of the USA?

a. ATD　　b. ADR　　c. TCDL　　d. UCAV

5. In the international data-distribution network the data flow from Predator to F/A-18 is sequentially through ________.

a. Hungary, VSAT satellite, Britain, the USA

b. Hungary, JAC, VSAT satellite, Britain, the USA

c. Hungary, Britain, VSAT satellite, the USA

d. Hungary, JBS, Britain, the USA

III. Translate the following sentences into Chinese.

1. It will carry multiple advanced, precision-guided munitions and use secure communications and advanced cognitive decision aids to provide a ground-based human operator with the situational awareness and positive air vehicle control necessary to authorize munitions release.
2. It will probably use encryption to prevent an enemy from eavesdropping on the information coming from the drone or interfering with the commands being sent.
3. However, the need to wait until the UAV had returned to base and its film been developed delayed the availability of imagery.
4. The program is intended to lead to a low cost, lightweight integrated MTI radar/flir payload for the Hunter to provide improved reconnaissance, surveillance, battle damage assessment, and targeting for non-line-of-sight weapons.
5. By the time of its second deployment to Bosnia, the Predator was hooked into an international data-distribution network the speed and complexity of which would have seemed like science fiction a few years ago.

Passage 3　A Sample of Military Radar Systems

Radar (Radio Direction And Ranging) functions by generating an output of microwave energy which is focused into a beam and illuminates an object in space. A small proportion of this energy is reflected back towards the radar where it is detected by an integral receiver. Microwave energy falls between infrared radiation and radio waves within the electromagnetic spectrum and has frequency and wavelength values in the range 0.03 to 100 GHz and 1 m to 3 mm respectively.

Because of the low power level of the reflected or 'echo' signal and its vulnerability to modulation and interference, the receiver used in a radar system must be particularly sensitive. The reduction in signal power between transmission and reception is usually defined in terms of a ratio between the two (in the order of 10 to 17:1) and expressed logarithmically in decibels (dB). Factors capa-