

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ
ФЕДЕРАЦИИ НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ ТОМСКИЙ
ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ

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ВОЕННО-ВОЗДУШНЫЕ СИЛЫ ВЕЛИКОБРИТАНИИ

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В настоящем пособии показаны организация Военно-воздушных сил Великобритании, части и подразделения, а также вооружение и военная техника ВВС.

Цель работы – изучение военной лексики, формирование навыков и умений в выполнении письменного и устного перевода текстов военного и военно-технического содержания.

Для курсантов Военного учебного центра Национального исследовательского Томского государственного университета, обучающихся по специальности «Лингвистическое обеспечение военной деятельности».

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Note for teachers

The “Royal Air Force” manual is designed for 12 hours of classroom work and 100 hours of independent work. It is a continuation of the textbooks, ‘British Army: English’ and ‘British Royal Navy: English’. It is designed for the training of military interpreters, especially for developing their sight translation and sight interpreting skills, and also for the study of corresponding military terminology.

Each lesson begins with the lesson vocabulary, the terms of which students must learn by heart beforehand. This is followed by preparatory exercises, the main text of the lesson and the main exercises for it.

When working with the manual, the use of the principle of activity (student-centred nature of studying) is implied, which consists in triggering the student’s interest in learning the foreign language, which occurs due to motivation grounded in the professional orientation of training. In the course of intensive mental work by the learners, based on a combination of mental and speech activity, they form the necessary knowledge, skills and abilities.

The goal of the manual, among other things, is to develop intercultural foundations of thinking and the formation of background knowledge. It is the degree of development of these categories that determines the level of communicative competence in general, as well as the professional foreign-language communicative competence of a military interpreter.

Exercises used:

Below we will mainly consider those practical exercises that are introduced at the advanced stage of military interpreter training in this special course.

Speech exercises in oral speech

1. Answers to questions on the main text. The task is formulated as “Answer the questions”. When performing all the exercises related to answering the questions, the use of the textbook or prepared written answers by the learners should not be permitted.

Sight translation exercises

It is recommended to do all sight translation exercises during independent work hours.

Translating from English. There are translations throughout the course. The task is formulated as a footnote “Translate”, or “Translate. Find out the meanings of unknown terms from a dictionary”.

Translation into English. For exercises on the written translation of texts, the task is formulated as “Translate. Find out the meanings of unknown terms from a dictionary”.

Aural translation from English

At an advanced stage of military translation training, you can switch from paragraph translation with notes to text translation with notes. For this type of exercise, the task is given as a footnote “Recommended for aural translation with notes” or “Translate after listening to the entire text (translation with notes)”.

Aural interpreting

Interpreting from English. For paragraph-and-phrase interpreting with notes, the task is given in the form of a footnote “Recommended for interpreting sentence by sentence”, or “Recommended for interpreting paragraph by paragraph”, or formulated as “Interpret by paragraphs (interpreting with notes)”. Interpreting into English. To practise the skills of paragraph-phrase interpreting, the task is formulated as “Interpret by sentences (the following sentences)” or “Interpret by paragraphs (interpreting with notes)”.

Two-way interpreting. The task is formulated as “Act as an interpreter”. It is preferable that three people participate in the interpreting dialogue. The first listener asks questions in Russian, the second answers in English, and the third acts as an interpreter. When performing these exercises, it is imperative to pay attention to the speed of reaction of the “interpreter”. To perform phrasal interpreting exercises of the same type of lexical material (with switching), the task is formulated as “Interpret”. It is recommended to use a tape recorder for these exercises.

Lesson 1

ROYAL AIR FORCE

Expeditionary Air Group	экспедиционная авиационная группа
Royal Air Force (RAF)	Королевские военно-воздушные силы Великобритании
Headquarters Air Command	штаб командования BBC
Air Combat Support Group	авиационная группа воздушной поддержки
recruitment	комплектование личным составом
initial and professional training	начальная и профессиональная подготовка
Army and Royal Navy	сухопутные войска и королевские BMC
Engineering unit	инженерно-техническое подразделение
Logistics unit	подразделение тылового обеспечения
Communications unit	подразделение связи
Medical Operations unit	медицинское подразделение
Joint Operating Area	район ведения боевых действий
ISAF Coalition	коалиция Международных сил содействия безопасности
UK Strategic Objectives	стратегические цели и задачи

airmen	рядовой авиации, авиационный специалист
National contingency forces	национальные силы быстрого реагирования
to provide capability	обеспечивать возможность
Air Mobility and Lift	авиаподъемность и воздушная транспортировка
Intelligence and Situational Awareness	разведка и оперативное реагирование
current and future operations	текущие и будущие операции
permanently committed forces	штатные силы
selection of personnel	отбор личного состава
dedicated to the protection and security	имеющий задачей охрану и оборону
international peace and stability	международный мир и стабильность
on a day-to-day basis	на ежедневной основе

I. Найдите в тексте и переведите словосочетания:

The world's longest established independent air force; to coordinate and deliver air power properly and effectively; managed by the Headquarters Air Command (situated in RAF High Wycombe); *to succeed on current and future operations*; permanently committed forces; national contingency forces; to meet a challenge to national interests; to meet unforeseen crises and contingencies.

II. Найдите в тексте эквиваленты словосочетаний:

Отдельная организация; отвечать за комплектование личным составом; осуществлять подготовку технического состава; осуществлять поддержку в зоне ведения боевых действий; осуществлять подготовку авиационных специалистов; для поддержания международного мира и стабильности; использоваться для непосредственной поддержки; противостоять непредвиденному кризису.

III. Рекомендуется для устного перевода на слух по предложениям:

The structure, purpose and capabilities of the Royal Air Force

The Royal Air Force (RAF) is the primary element of British air power and the world's longest established independent air force. It was originally formed in 1918, after an independently commissioned report acknowledged that the provision of air power through separate Army and Navy elements had been inefficient and wasteful; instead, a single, dedicated organisation was necessary to coordinate and deliver air power properly and effectively.

The RAF consists of five groups: No. 1 Group, No. 2 Group, No. 22 Group, No. 38 Group and No. 83 Expeditionary Air Group, all of which are managed by the Headquarters Air Command (situated in RAF High Wycombe) and have their own individual roles.

No. 1 Group (the Air Combat Group)'s mission is "To understand, control, and exploit the battlespace in order to deliver decisive Combat Air Power."; No. 2 Group (the Air Combat Support Group) generates, sustains and develops the forces needed to succeed on current and future operations; No. 22 (Training) Group is responsible for the recruitment, selection, and initial and professional training of RAF personnel as well as providing technical training for the Army and Royal Navy; No. 38 Group brings together the RAF's Engineering, Logistics, Communications and Medical Operations units; and No. 83 Expeditionary Air Group "supports operations in the Joint Operating Area (JOA) in order to contribute to the achievement of the stated ISAF Coalition operational end-states and UK Strategic Objectives."

The RAF exists to organise, train and equip airmen to provide:

- Permanently committed forces dedicated to the protection and security of the United Kingdom and her dependent territories.
- National contingency forces providing the core capability to meet a challenge to national interests – including, if required, military aid to the civil authorities – and operations in support of international peace and stability.

These forces provide four essential capabilities in support of the UK defence mission: Control of the Air; Air Mobility and Lift; Intelligence and Situational Awareness; and Attack. The four areas of air power capabilities provided by the RAF are used in direct support of the defence and security of the United Kingdom on both a day-to-day basis, and to meet unforeseen crises and contingencies.

IV. Ответьте на вопросы:

1. What does RAF stand for?
2. What is the reason for the RAF being a single, dedicated organization?
3. Which groups does the RAF comprise of?
4. What is the mission of the Training Group?
5. What does the RAF exist for?
6. What are the RAF's four essential capabilities?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Состав, предназначение и задачи Королевских ВВС Великобритании.

Королевские ВВС, являясь старейшими военно-воздушными силами в мире, представляют собой основную составляющую воздушной мощи Великобритании. В 1918 г. высшее военное руководство Великобритании осознало, что использование авиации только как средств поддержки действий наземных сил и флота неэффективно, соответственно, появилась необходимость в ВВС как отдельном виде вооруженных сил.

В состав Королевских ВВС входят:

1. Штаб командования, имеющий задачей оперативное управление ВВС.
2. Группа № 1 (боевая) – предназначена для ведения боевых действий в воздухе и нанесения ударов по наземным целям, в ней сосредоточены все боевые самолёты Королевских ВВС.
3. Группа № 2 (непосредственного обеспечения) – содержит силы и средства для основных видов обеспечения воздушных операций.

4. Группа № 22 (учебно-тренировочная) – предназначена для отбора и боевой подготовки личного состава королевских ВВС.

5. Группа № 38 (боевого и тылового обеспечения) – содержит элементы технического, инженерного и медицинского обеспечения.

6. Группа № 83 (экспедиционная) – представляет собой силы и средства королевских ВВС, базирующиеся за пределами Великобритании.

Основной задачей Королевских ВВС является поддержание высокой боевой готовности воздушных сил для успешного выполнения боевых задач по защите территориальной целостности Великобритании, а также поддержания мира и стабильности. Это достигается контролем воздушного пространства, разведкой и завоеванием, в случае необходимости – господства в воздухе.

VI. Выступите в роли переводчика

Вся авиационная техника ВВС Великобритании объединена в пять авиагрупп, что это за авиагруппы?	The Royal Air Force includes No. 1 Group, No. 22 Group, No. 38 Group and No.83 Expeditionary Air Group. No. 1 Group is designed to conduct combat aerial operations, and stage strikes on ground targets. It comprises all the combat aircraft of the RAF
Какова основная задача группы № 2?	The main task of the Group is air operations support. To fulfil this task, it's armed with auxiliary planes (aerial refuelling tankers, remotely piloted aircraft systems, reconnaissance aircraft, cargo aircrafts) and all types of helicopters
Каковы основные задачи Королевских ВВС?	The main mission of the RAF is to maintain its forces in high-level combat readiness to meet threats to the UK, as well as to maintain peace and stability

Lesson 2

ORGANIZATION AND COMBAT TASKS OF AVIATION FORMATION AND UNITS

directly supervised by	под непосредственным управлением
Chief of Staff of the Air Force	начальник штаба ВВС
Air Command	авиационное командование
air squadron	авиаэскадрилья
fighter-bomber squadron	эскадрилья истребителей-бомбардировщиков
fighter-assault squadron	истребительная эскадрилья
air defence squadrons	эскадрилья ПВО
tactical reconnaissance squadron	эскадрилья тактической разведки
special purpose squadron	эскадрилья специального назначения
Air Group	авиагруппа
intercept enemy air targets	перехватывать воздушные цели противника
AEW (air electronic warfare) and control	дальнего радиолокационного обнаружения (ДРЛО) и управления
EW (electronic warfare) aircraft	самолет РЭБ
basic patrol aircraft	патрульный самолет

aeronautical squadron of RPAS (remotely piloted air system)	эскадрилья БПЛА
search and rescue helicopter squadron	эскадрилья поисково-спасательных вертолетов
EW	РЭБ
air traffic control and aerial management	диспетчерская служба управления воздушным движением
to man with personnel	комплектовать личным составом
to be responsible for the readiness for combat use	отвечать за боевую готовность
military cargo	военный груз
alert system	система предупреждения
legal support	правовая поддержка
quartering	расквартировка
to isolate the combat area	блокировать зону боевых действий

I. Найдите в тексте и переведите словосочетания:

Directly supervised by; is responsible for the readiness of units for combat use; be divided into offensive and defensive forces; intercepting and destroying enemy air targets; search and rescue helicopter squadrons; carrying out the transport of troops and military cargoes by air; ensuring the functioning of operational control and alert systems.

II. Найдите в тексте эквиваленты словосочетаний:

Находиться под непосредственным командованием начальника штаба ВВС; организационно объединены в; отвечать за боевую готовность подразделений и частей ВВС; включать в себя 18 эскадрилий военной авиации; осуществлять тактическую воздушную разведку; выполнять задачи по авиатранспортировке личного состава и техники; вести РЭБ; оказывать правовую помощь.

III. Рекомендуются для устного перевода на слух по предложениям:

Organization and combat tasks of aviation formations and units

The Royal Air Force, directly supervised by the Chief of Staff of the Air Force, is organisationally consolidated into the Air Command (headquartered at RAF High Wycombe). It administers the No. 1 (Tactical), No. 2 (Support) and No. 22 (Training) Aviation Groups and is responsible for the readiness of Air Force formations and units for combat use.

No. 1 Aviation Group of Tactical Aviation is divided into offensive and defensive forces, which include 18 air squadrons of combat aviation: 11 tactical fighter-bomber squadrons (1, 3, 4, 9, 11, 12, 14, 15, 20, 31 and 617); two fighter-assault squadrons (800 and 801); two air defence squadrons (43 and 111); two tactical reconnaissance squadrons (2 and 13) and one special purpose squadron (100). The Air Group's tasks are the following: conquest of the air, isolating the combat area, direct air support, intercepting and destroying enemy air targets, and conducting tactical aerial reconnaissance.

No. 2 Aviation Group of Utility and Supporting Aviation includes the following squadrons: two aircraft squadrons of AEW and control (8 and 23); one squadron of EW aircraft (51); one reconnaissance squadron (5); three squadrons of basic patrol aircraft (42, 120 and 201); an aeronautical squadron of RPAS (39); six squadrons of military transport aviation (24, 30, 47, 70 and 99 and one squadron for the transportation of the leadership of the country and the armed forces - 32); two transport-refuelling Airborne squadrons (101 and 216); seven helicopter squadrons (7, 18, 27, 28, 33, 78 and 230) and three search and rescue helicopter squadrons (22, 202 and 203). The Group is assigned the tasks of carrying out the transport of troops and military cargoes by air, conducting EW, providing refuelling of airplanes in the air, air traffic control and aerial management, as well as ensuring the functioning of operational control and alert systems for the British air defence system.

No. 22 (Training) Aviation Group is designed to solve the tasks of manning the air force with personnel, training in all military registration specialities, quartering, retirement and legal support.

IV. Ответьте на вопросы:

1. Who is the commander of the Royal Air Force?
2. What does the Air Command administer?
3. What is the Aviation Group of Tactical Aviation divided into?
4. What are the Air Group's tasks?
5. What does RPAS stand for?
6. What is the Aviation Group of Utility and Supporting Aviation designed for?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Организация и боевые задачи частей и подразделений авиации.

Королевские ВВС, находясь под непосредственным командованием начальника штаба ВВС, организационно сведены в авиационное командование, которое включает в себя боевую авиационную группу, группу обеспечения и учебно-тренировочную группу. Основная задача авиационного командования – поддержание боевой готовности авиационных частей и подразделений.

Боевая группа тактической авиации организационно разделена на наступательные и оборонительные силы. В состав группы входят 11 эскадрилий истребителей-бомбардировщиков, две воздушно-штурмовые эскадрильи, две эскадрильи ПВО, две эскадрильи воздушной разведки и одна эскадрилья специального назначения. Задачами боевой группы являются завоевание господства в воздухе, непосредственная воздушная поддержка наземных сил, перехват и уничтожение летательных аппаратов противника и ведение воздушной разведки.

В состав группы обеспечения входят две эскадрильи ДРЛО (дальнего радиолокационного обнаружения) и управления, эскадрилья РЭБ, разведывательная эскадрилья, три эскадрильи ближ-

ней разведки, эскадрилья БПЛА, шесть эскадрилий транспортной авиации, одна эскадрилья специальных бортов для высшего военного руководства, две эскадрильи топливозаправщиков и шесть вертолетных эскадрилий. Задачами группы являются переброска войск по воздуху, РЭБ, дозаправка самолетов и вертолетов в воздухе, организация авиадиспетчерской службы, а также обеспечение работы системы управления и оповещения системы ПВО.

Учебно-тренировочная группа имеет задачей отбор и боевую подготовку личного состава авиационных частей и подразделений.

VI. Выступите в роли переводчика:

Расскажите, пожалуйста, о создании Королевских ВВС. Какую роль они играли на заре своего основания?	The Royal Air Force (RAF) is the United Kingdom's aerial warfare force. It was formed towards the end of the First World War on 1 April 1918. Following victory over the Central Powers in 1918 the RAF emerged as, at the time, the largest air force in the world. Since its formation, the RAF has taken a significant role in British military history. In particular, it played a large part in the Second World War where it fought its most famous campaign, the Battle of Britain
Что вы можете сказать об организации Королевских ВВС?	The professional head of the RAF is the Chief of the Air Staff (CAS). The CAS heads the Air Force Board, which is a committee of the Defence Council. The Air Force Board is the management board of the RAF and consists of several high-ranking officers. Authority is delegated from the Air Force Board to the RAF's commands. While there were once individual commands responsible for bombers, fighters, training, etc., now only the Air Command exists, headquartered at RAF High Wycombe.

<p>Что вы можете сказать об организации Королевских ВВС?</p>	<p>As this command is headed by the Chief of the Air Staff himself, it does not operate in way previous commands did with their own separate Air Officers Commanding and staff remote from Whitehall</p>
<p>Как обстоит дело с центрами подготовки, учебными заведениями летного состава?</p>	<p>The RAF Schools consist of the squadrons and support apparatus that train new aircrew to join front-line squadrons. The schools separate individual streams, but group together units with similar responsibility or that operate the same aircraft type. Some schools operate with only one Squadron, and have an overall training throughput which is relatively small; some, like 3 FTS, have responsibility for all Elementary Flying Training (EFT) in the RAF, and all RAF aircrew will pass through its squadrons when they start their flying careers. 2 FTS and 6 FTS do not have a front-line training responsibility – their job is to group the University Air Squadrons and the Volunteer Gliding Squadrons together. 2 FTS's commanding officer holds the only full-time flying appointment for a Group Captain in the RAF, although he is a reservist</p>

Lesson 3

THE CLASSIFICATION AND PURPOSES OF AIRPLANES AND HELICOPTERS

versatility	универсальность боевого применения
multipurpose fighter	многофункциональный истребитель
fighter-bomber	истребитель-бомбардировщик
breaching	прорыв
ground-attack aircraft	штурмовик
combat helicopters	боевой вертолет
scout aircraft	самолет-разведчик
to conduct aerial reconnaissance	осуществлять воздушную разведку
have at disposal	иметь в распоряжении
combine two functions – fighter and bomber	сочетать в себе функции истребителя и бомбардировщика
destruction of enemy air targets	уничтожение воздушных целей противника
optimized for	приспособленный к
transportation of various military cargoes and personnel	перевозка различных военных грузов и личного состава
Boeing RC-135W	Boeing RC-135W «Ривет Джойнт»

Harrier GR.7	Бритиш Аэропейс / Макдоннелл Дуглас «Харриер» II
Lockheed Martin C-130J	Локхид Мартин C-130J «Супер Геркулес»
Chinook HC2	Боинг СН-47 «Чинук»
Lynx ah7	Уэстленд «Линкс», «Линкс» АН.7
Puma HC Mk.2	«Пума» HC Mk.2
MQ-9 Reaper (multi-role remotely piloted aircraft system)	MQ-9 «Рипер»
RPAS Remotely Piloted Aircraft Systems	телепилотируемый летательный аппарат

I. Найдите в тексте и переведите словосочетания:

A variety of aircraft of different classes; to minimise the number of aircraft flying on the job; be able to destroy ground targets; be optimised for operations over the battlefield; perform the task of destroying land and sea targets; transportation of various military cargoes and personnel.

II. Рекомендуются для устного перевода на слух по абзацам с заметками:

Classification of airplanes and helicopters, and their purpose

The Royal Air Force has at its disposal a variety of aircraft of different classes. A certain number of combat vehicles combine two functions – fighter and bomber. This versatility allows the RAF to minimise the number of aircraft flying on the job.

The main classes of military airplanes and helicopters of the Royal Air Force:

- Multipurpose fighters. Includes such aircraft as the F-35 Lightning II (fighter-bomber), Typhoon FGR4, and Tornado GR4 (fighter-bomber). The main task of fighters is the destruction of enemy air

targets. Multipurpose fighters are also able to destroy ground targets, perform the function of breaching, etc.

- Ground-attack aircrafts. Includes such aircraft as the Harrier GR.7. The modern ground-attack aircraft is optimised for operations over the battlefield and can carry a large assortment of non-nuclear weapons. Aircraft of this class perform the task of supporting ground forces over the battlefield and destroying land and sea targets.



Pic. 1. Main types of aircraft and helicopters

- Combat helicopters. The RAF's combat helicopters include such aircraft as the Lynx AH7. The main task of combat helicopters is the destruction (assault) of targets on the ground;

- Transport. Includes airplanes and helicopters such as the Chinook HC2, Westland Sea King HAR3, Britten-Norman Islander BN-2A, and Lockheed Martin C-130J. The main task of these aircraft is the transportation of various military cargoes and personnel;

- Scout aircraft. Includes such aircraft as the Shadow R1, Raytheon Sentinel, and Boeing RC-135W. Their main task is to conduct aerial reconnaissance.

III. Ответьте на вопросы:

1. What kind of functions can the combat vehicle combine?
2. What is the main tasks of the multipurpose fighters?
3. What are modern ground-attack aircraft optimised for?

4. What is the main task of combat helicopters?
5. Which transport aircraft do you know?
6. Which kind of aircraft is designed for conducting aerial reconnaissance?

IV. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Классификация самолетов и вертолетов и их предназначение.

На вооружении Королевских ВВС находится множество различных типов летательных аппаратов. Основным типом самолетов, стоящих на вооружении, – истребители-бомбардировщики. Их двойное назначение позволяет минимизировать количество самолетов, необходимых для выполнения боевых задач.

Основные типы летательных аппаратов Королевских ВВС:

– Многофункциональные истребители-бомбардировщики (Ф-35, Тайфун, Торнадо), чьим основным предназначением является завоевание господства в воздухе и уничтожение отдельных наземных целей.

– Штурмовики, например Харриер. Задачей данного типа самолетов является непосредственная поддержка с воздуха действий наземных сил.

– Боевые вертолеты. Их задачи схожи с задачами штурмовой авиации, основной из которых является уничтожение с воздуха бронетехники противника.

– Транспортные вертолеты и самолеты для переброски войск и материальной части по воздуху. Основные типы летательных аппаратов: транспортный самолет С-130, вертолеты Чинук и Си Кинг.

Летательные аппараты воздушной разведки. В последнее время для выполнения задач воздушной разведки в основном используются беспилотные летательные аппараты (БЛА).

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

A typical MQ-9 system consists of multiple aircraft, ground control station, communications equipment, maintenance spares, and per-

sonnel. A military flight crew includes a pilot, sensor operator, and Mission Intelligence Coordinator. The aircraft is powered by a 950 horsepower turboprop, with a maximum speed of about 300 mph and a cruising speed of 170–200 mph. With a 66 ft wingspan, and a maximum payload of 3,800 lb, the MQ-9 can be armed with a variety of weaponry, including Hellfire missiles and 500-lb laser-guided bomb units. Endurance is 30 hours when conducting ISR missions, which decreases to 23 hours if it is carrying a full weapons load. The Reaper has a range of 1,150 mi and an operational altitude of 50,000 ft, which makes it especially useful for long-term loitering operations, both for surveillance and support of ground troops.



Pic. 2. MQ-9 Reaper

An MQ-9 can adopt various mission kits and combinations of weapons and sensors payloads to meet combat requirements. Its Raytheon AN/AAS-52 multi-spectral targeting sensor suite includes a colour/monochrome daylight TV, infrared, and image-intensified TV with laser rangefinder/laser designator to designate targets for laser guided munitions.[citation needed] The aircraft is also equipped with

the Lynx Multi-mode Radar that contains synthetic aperture radar (SAR) that can operate in both spotlight and strip modes, and ground moving target indication (GMTI) with Dismount Moving Target Indicator (DMTI) and Maritime Wide-Area Search (MWAS) capabilities. The Reaper was used as a test bed for Gorgon Stare, a wide-area surveillance sensor system. Increment 1 of the system was first fielded in March 2011 on the Reaper and could cover an area of 6.2 sq mi; increment 2, incorporating ARGUS-IS and expanding the coverage area to 39 sq mi, achieved initial operating capability (IOC) in early 2014. The system has 368 cameras capable of capturing five million pixels each to create an image of about 1.8 billion pixels; video is collected at 12 frames per second, producing several terabytes of data per minute.

In January 2012, General Atomics released a new trailing arm design for the Reaper's main landing gear; benefits include an over 30 percent increase in landing weight capacity, a 12 percent increase in gross takeoff weight (from 10,500 pounds to 11,700 pounds), a maintenance-free shock absorber (eliminating the need for nitrogen pressurization), a fully rejected takeoff brake system, and provisions for automatic takeoff and landing capability and Anti-lock Brake System (ABS) field upgrades. In April 2012, General Atomics announced possible upgrades to USAF Reapers, including two extra 380 l fuel pods under the wings to increase endurance to 37 hours. The wingspan can also be increased to 88 feet, increasing endurance to 42 hours. The USAF has bought 38 Reaper Extended Range (ER) versions, carrying external fuel tanks (which don't affect weapon capacity), the heavy-weight landing gear, a four-bladed propeller, a new fuel management system which ensures fuel and thermal balance among external tank, wing, and fuselage fuel sources, and an alcohol-water injection (AWI) system to shorten required runway takeoff length; these features increase endurance from 27 to 33–35 hours, while the company is still pitching the lengthened wing option. The Reaper ER first flew operationally in August 2015. The aircraft also has the sensor ball replaced with a high-definition camera, better communications so ground controllers can see the higher quality video, software to enable automatic

detection of threats and tracking of 12 moving targets at once, and the ability to “super ripple” fire missiles within 0.32 seconds of each other.

VI. Выступите в роли переводчика:

Какой тип самолетов является основным в Королевских ВВС?	The main class of military airplanes which are organic to the Royal Air Force is multipurpose fighters. On account of its multi-functionality, it allows to reduce the number of jets simultaneously conducting their combat missions
Не могли бы Вы назвать один из образцов, принадлежащих к классу много-функциональных истребителей-бомбардировщиков?	One such example is the Lockheed Martin F-35 Lightning II, designed by the American company Lockheed Martin Corporation, which belongs to the family of fifth-generation multipurpose stealth fighters
В чем состоит назначение штурмовиков?	An attack aircraft is an aerial vehicle (plane, helicopter, RPAS which belongs to assault aviation, designed to provide direct combat support to friendly ground and naval forces, as well as to deliver precise strikes on enemy various ground and naval targets (structures, weaponry, and military vehicle)
Какой основной тип вооружения используется в штурмовиках для поражения целей?	An attack aircraft hits ground and naval targets with aircraft guns (cannons and machineguns) and rockets. This attack profile is more suitable for hitting elongated targets, such as pileups (especially march columns) of enemy’s riflemen (infantry), weapons and military equipment

Lesson 4

SCHEMATIC DESIGN OF THE AIRPLANE, HELICOPTER

screw propeller	винтовой пропеллер
airframe	планер самолета
jet engine	реактивный двигатель
powerplant	силовая установка
fuselage	фюзеляж
wings	крылья
empennage	хвостовое оперение
landing gear	шасси
central portion	средняя часть
cockpit	кабина экипажа
airfoil	аэродинамическая поверхность
lifting surface	несущая поверхность
high-wing	высоко расположенное крыло, высокоплан
mid-wing	среднерасположенное крыло
low-wing	низко расположенное крыло, низкоплан
tail section	хвостовая часть
trim tab	триммер
pitch	крен
rudder	руль направления
landing skid	полосковое шасси
strut	нога шасси

ski	лыжное шасси
reciprocating engine	поршневой двигатель
turbine engine	газотурбинный двигатель
power-driven	на механической тяге
hinged shaft	шарнирный вал
mast	вал несущего винта
torque	крутящий момент; реактивный момент (несущего винта вертолета)
ducted fan	винт в кольце
single-rotor helicopters	вертолет одновинтовой схемы
counter-rotating rotors	винты противоположного вращения
3-bearing swivel nozzle	регулируемое реактивное сопло с отклоняемым вектором тяги
roll nozzle ducts	трубки сопла реактивной системы поперечного управления
leading-edge flap actuators	приводы закрылков
Pratt & Whitney F135 engine	двигатель Пратт энд Уитни F135
weapon bay door with mounted missile	створка оружейного отсека с установленной ракетой
lift fan drive-shaft	ведущий вал подъемного вентилятора
lift fan clutch	муфта подъемного вентилятора
split duct air intake	трубки воздухозаборника
valve box nozzle	выпускное отверстие клапанной камеры
lower lift fan door	нижняя створка отсека подъемного вентилятора
forward fuel tank	носовой топливный бак

oxygen under forward tank	кислородный бак
radar	радар
rudder pedals	педали управления рулем направления
Martin-Baker Mk16 ejection seat	катапультируемое кресло Martin-Baker Mk16
lift fan	подъемный вентилятор
lift fan doors	створки отсека подъемного вентилятора
auxiliary vent doors	створки вспомогательного воздуховода
wheel bay	ниша шасси
rudder activator	привод руля направления
fin fuel tank	килевые топливные баки
tailpipe activator	задвижка хвостового сопла
stabilizer bar	стабилизатор поперечной устойчивости
rotor	несущий винт
tail fin	вертикальное хвостовое оперение
swash plate	автомат перекоса
tail rotor drive shaft	ведущий вал хвостового ротора
tail rotor	хвостовой ротор
cowling	обтекатель
tail skid	хвостовая предохранительная опора
tail boom	хвостовая балка
mast	вал несущего винта
transmission	трансмиссия
engine mount	рама крепления двигателя
synchronized elevator	синхронизируемый руль высоты
cabin doors	двери кабины
landing skids	полосковое шасси

I. Найдите в тексте и переведите словосочетания:

Aixed-wing aircraft that is heavier than the air; composition of the airframe can differ depending on the type of the aircraft; be designed to carry passengers and/or cargo; be attached at different portions of the fuselage; the movable parts of the horizontal stabiliser; to move the nose of the airplane to the sides; to take off and land vertically; to eliminate the effects of torque.

II. Найдите в тексте эквиваленты словосочетаний:

Самолет состоит из; конструкция большинства самолетов включает в себя следующие части; центральная часть корпуса; перевозить пассажиров или груз; низко расположенное крыло; изменять крен воздушного судна; двигать в стороны нос самолета; состоять из двигателя и всех его компонентов.

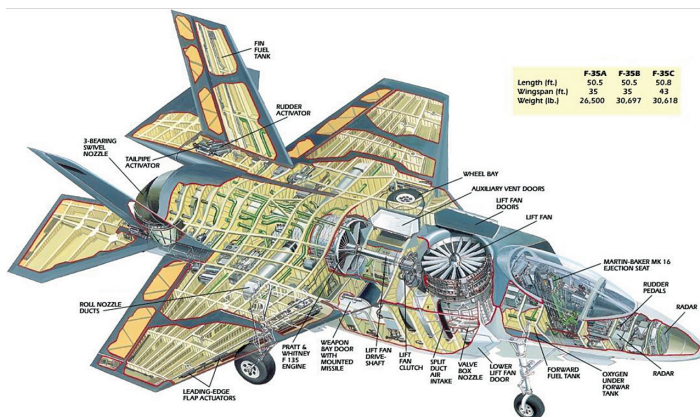
III. Рекомендуются для устного перевода на слух по абзацам с заметками

Schematic design of an airplane (helicopter)

The airplane is a fixed-wing aircraft that is heavier than the air, propelled by a screw propeller or a jet engine. The airplane consists of the airframe and the powerplant. The composition of the airframe can differ depending on the type of the aircraft, but most airplanes comprise the following basic parts: the fuselage, wings, empennage and landing gear.

The fuselage is the central portion of the body of an airplane. It includes the cabin and / or the cockpit, which contains seats for the crew and the controls for the airplane. The cabin can be designed to carry passengers and / or cargo, its size and structure can differ in accordance with the aircraft's purpose. The fuselage may also provide attachment points for the other major airplane components.

The wings are the airfoils attached to each side of the fuselage and are the main lifting surfaces that support the airplane in flight. Wings may be attached at different portions of the fuselage: high-wing, mid-wing and low-wing designs.



Pic. 1. F-35 schematic design

The number of wings can also vary: airplanes with a single set of wings are called monoplanes; airplanes with two sets are called biplanes.

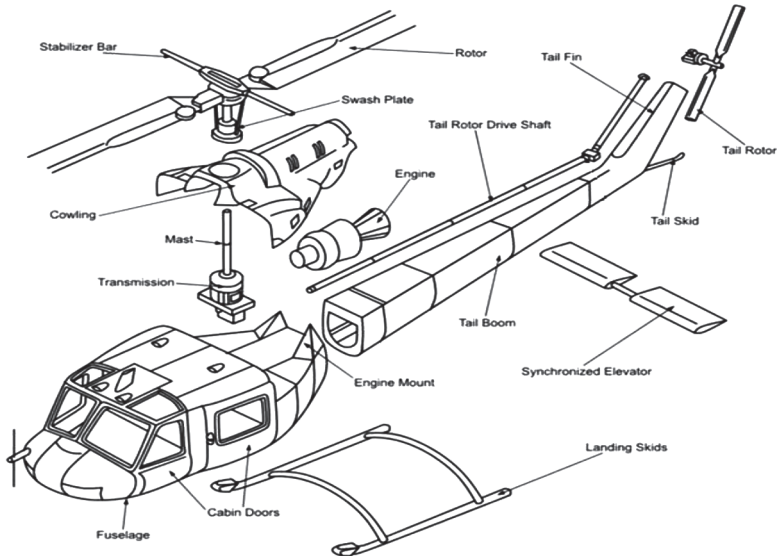
The empennage is the tail section of an airplane; it includes a horizontal stabilizer and a vertical stabilizer. The movable parts of the horizontal stabilizer include elevators and trim tabs, which are used to adjust the airplane's pitch in the air. The movable part of the vertical stabilizer is called the rudder and is used to move the nose of the airplane to the sides.

The landing gear is located on the bottom part of the airplane's fuselage, it usually consists of wheels and struts, or, in some cases, skis or floats.

The airplane's powerplant consists of the engine and all engine components, the propeller and the electrical system. Airplanes use three types of engines: reciprocating engines, turbine engines and jet engines.

The helicopter is an aircraft with one or more power-driven horizontal propellers or rotors that enable it to take off and land vertically, to move in any direction, or to remain stationary in the air. The helicopter's airframe consists of the fuselage, empennage and landing gear, which can consist of either landing skids or a set of wheels and struts.

The main airfoil of the helicopter is the rotor mounted on top of the fuselage on a hinged shaft (mast) connected with the vehicle's engine and flight controls. To eliminate the effects of torque, which causes the helicopter to turn in the opposite direction to the rotor, single-rotor helicopters use a smaller tail rotor or a ducted fan. Other helicopters use two main counter-rotating rotors to eliminate the effects of torque.



Pic. 2. UH-1H schematic design

IV. Ответьте на вопросы:

1. What is the airplane?
2. What basic parts do airplanes comprise?
3. What does the fuselage include?
4. At what portions of the fuselage can the wings be attached?
5. What does the empennage include?
6. What types of engine do airplanes use?
7. What does the helicopter's airframe consist of?
8. What is the purpose of a smaller tail rotor?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Самолет – это летательный аппарат тяжелее воздуха, приводимый в движение при помощи пропеллера или реактивной тяги. Он состоит из планера и силовой установки. Силовая установка включает в себя всю совокупность устройств и систем для создания силы тяги (двигатели, движители, стартовые и полётные ускорители, устройства реверса тяги и т.п.). Планер – это структурная часть самолёта или вертолёт без силовой установки и оборудования.

Подъемная сила летательных аппаратов тяжелее воздуха создается за счет крыла либо несущего винта. Крылья самолетов могут крепиться к разным частям фюзеляжа в зависимости от конструкции.

Управление в воздухе самолетом осуществляется при помощи изменения положения плоскостей управления, а вертолетом – изменением наклона оси несущего винта.

Основным элементом планера является фюзеляж. В нем размещаются экипаж и органы управления, а также пассажиры и / или груз. Компоновка фюзеляжа существенно различается в зависимости от типа летательного аппарата.

VI. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

A plane is a heavier-than-air aircraft with fixed wings used for the creation of lift when in motion. This motion is created by the propulsion power of the engine. Airplanes are designed for transportation of people and cargo, and also for special and military purposes. A combat plane is a plane equipped with various weapons and designed to hit air and ground targets and for accomplishing special missions.

In accordance with the mission combat planes are divided into bombers, fighter-bombers, attack planes, reconnaissance and transport planes.

The main parts of a plane are the fuselage, the wings, the tail unit and the power plant.

A fuselage is the plane body which connects the wings with the tail surface and holds the crew (a pilot, a copilot, a navigator, a flight

engineer, a bombardier and others), the equipment of the plane and the cargo.

A wing is designated to develop the lift of the plane. It consists of a framework made mainly of spars and ribs and has a metal covering.

The tail surface of a plane is needed to control forces and change the flying mode. Usually it consists of fixed parts: the horizontal stabiliser, the vertical stabiliser, agile elevators and rudder.

The landing gear is a device for takeoff and landing. It can be either retractable or non-retractable, depending on the plane's construction.

VII. Выступите в роли переводчика:

Что понимается под термином «фюзеляж»? Для чего он предназначен?	Usually, the term fuselage means an aircraft body. It is fuselage to which empennage, wings, and landing gear are attached. Its primary uses are to accommodate crew, to carry passengers, cargo, or technical equipment. It can also be fitted with fuel tanks or powerplant
Всем известно, что ключевой частью самолета является крыло? Каково его основное предназначение?	The main purpose of the wings is to produce wing lift. A low pressure area forms above the upper edge of the wing, while a high pressure area forms below the lower edge of the wing, so the wing is "pushed" upward, and the plane flies up
За счет каких средств достигается устойчивость и управляемость самолета в полете?	Stability and sensitivity of an aircraft are provided by means of assembly of airfoils, called fins, which consist of vertical and horizontal fins. Due to the fact that these fins are located in the tailpiece, it's also called empennage
Что в корне отличает вертолет от самолета?	Helicopter is a rotary-wing craft capable of vertical take-off and landing. Its ascensional and propulsion forces are produced by means of one or several rotors with one or several drive connections during all stages of flight

Lesson 5

SCHEMATIC DESIGN OF THE JET ENGINE

TYPES OF AIRCRAFT ENGINES

jet engine	реактивный двигатель
consists of four main parts	состоять из четырех основных частей
compressor	компрессор
combustor chamber	камера сгорания
constant pressure	постоянное давление
nozzle	сопло
inlet airstream	входящий воздушный поток
combustion products	продукты сгорания
thrust	тяга
reciprocating engine (piston engine)	поршневой двигатель
internal-combustion engine	двигатель внутреннего сгорания
turboprop (jet-prop) engine	турбиновинтовой двигатель
turbofan engine	турбореактивный двухконтурный двигатель
turbojet engine	турбореактивный двигатель
rearward discharge of a jet	струя газов реактивного двигателя
inlet airstream	встречный поток воздуха
rotational motion	вращательное движение
propeller	винт

engine's exhaust	выхлоп двигателя
air inlet	забор воздуха, воздухозаборник
intake	впуск, выпускное устройство
exhaust	выхлоп
primary stream	основной воздушный поток

I. Найдите в тексте и переведите словосочетания:

Rearward discharge of a jet; hot gases generated by burning fuel; 10 to 40 times the pressure of the inlet airstream; the continuous stream of high-pressure combustion products; to use one or more pistons in order to convert pressure; to power the air compressor; attached turbojet engine

II. Найдите в тексте эквиваленты словосочетаний:

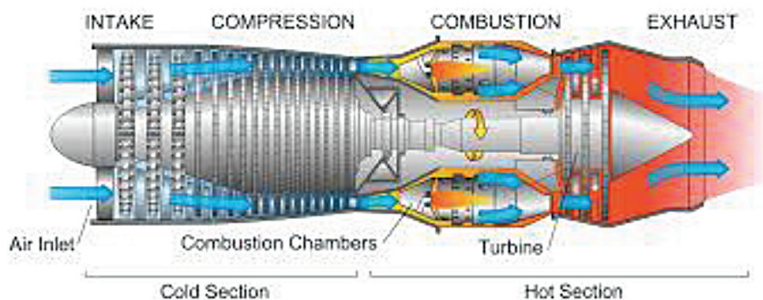
Двигатель внутреннего сгорания; сжимать воздух до показателя в; относительно постоянное давление; выходить из двигателя через сопло для создания тяги; вращательное движение винта; использовать газ как рабочее тело; создавать достаточную для движения самолета тягу.

III. Перевести устно на слух по абзацам:

Schematic design of the jet engine; the types of modern aircraft engines

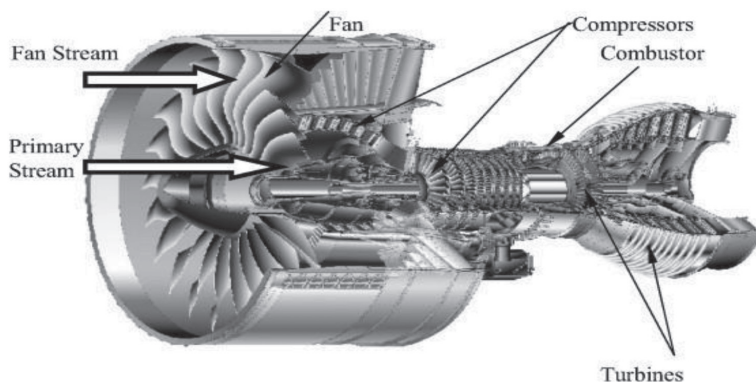
The jet engine is an internal-combustion engine that propels an aircraft by means of the rearward discharge of a jet, usually hot gases generated by burning fuel with air drawn in from the atmosphere.

The jet engine consists of four main parts: the compressor, combustor chamber, turbine and nozzle. The compressor is used to compress the air to a pressure ratio of typically 10 to 40 times the pressure of the inlet airstream. The compressed air then flows into the combustor chamber, where a steady stream of fuel mixes with it and burns at approximately constant pressure. The continuous stream of high-pressure combustion products then flows through the turbine, which powers the compressor, and exits the engine through the nozzle to produce thrust.



Modern aircraft use the following types of engines:

- The reciprocating engine (piston engine) is an internal-combustion engine that uses one or more pistons in order to convert pressure created by burning fuel into rotational motion of the propeller.
- The gas-turbine engine is an internal-combustion engine that uses gas as the working fluid to turn the turbine, which powers the air compressor. The thrust is produced when hot gas exits the engine through the nozzle.



- The turboprop (jet-prop) engine is a turbine engine, which works in a way that is quite similar to the gas-turbine engine, except that the turbine works to rotate the propeller, and the engine's exhaust is too weak to produce enough thrust to move the airplane on its own.

- The turbofan engine is similar to a turboprop engine, but has a fan instead of a propeller, which is enclosed in the casing. Another difference is that a turbofan's turbine is driven not by an internal-combustion engine, but by an attached turbojet engine.

- Jet engine.

IV. Ответьте на вопросы:

1. By what means does an internal-combustion engine propel an aircraft?
2. What main parts does a jet consist of?
3. What is the purpose of the compressor?
4. How is thrust produced?
5. What is the difference between a piston engine, gas-turbine engine, and jet-prop engine?
6. By what means is the turbofan engine driven?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Турбореактивный двигатель

Турбореактивный двигатель состоит из пяти основных компонентов: всасывающего патрубка, ротационного воздушного компрессора впереди, группы камер сгорания, в которых непрерывно воспламеняется впрыскиваемое топливо, турбины, вращающейся на общем валу с компрессором, и сопла.

Для запуска ТРД открывается топливный клапан и нажимается переключатель управляющего регулятора зажигания. Стартер прокручивает основной вал, в то время как катушки зажигания подают на свечи ток высокого напряжения для воспламенения воздушно-топливной смеси. После воспламенения смеси в любой из двух камер со свечами зажигания пламя распространяется в другие камеры через соединительные трубки. Прогрев ТРД не требуется, так как отсутствует трение металла о металл, и только некоторые узлы двигателя нуждаются в смазке.

На земле воздух нагнетается в камеру при помощи компрессора, а топливо подается под высоким давлением при помощи

топливного насоса и непрерывно воспламеняется. В полете в подаче воздуха компрессору помогает встречный поток.

Скоростной выброс горячей смеси через лопатки приводит во вращение турбину с частотой оборотов от 8 до 16 тыс. об./мин. Выработанная механическая энергия используется компрессором и вспомогательными устройствами, таким образом, в камеру сгорания нагнетается больший объем воздуха для продолжения цикла.

Так же как и обычному двигателю, ТРД на больших высотах требуется меньше топлива.

Подача топлива в камеры сгорания регулируется автоматическим регулятором с барометром.

V. Выступите в роли переводчика:

Общеизвестно, что на данный момент самым распространенным видом реактивных двигателей является турбореактивный двигатель. Что вы можете сказать о принципе его работы?	A turbojet engine works in the following way: a compressor sucks air in, compresses it, and directs it to a combustion chamber. There the compressed air mixes with fuel, inflames, and expands. The expanded gas forces the turbine, which is located on the same shaft with the compressor, to rotate. The remaining part of energy is moved to a convergent-divergent nozzle. As a result of directed efflux from the nozzle, the engine is affected by the thrust
Какой основной тип двигателя применяется в винтовой авиатехнике?	In such a class of vehicle, piston engines are usually used. It produces thrust by means of a rotation movement of the propeller, as well as compound engines, with the thrust produced by the propeller being more than 50% of the total thrust of the engine

Из каких основных частей состоит реактивный двигатель?	Any jet engine has to consist of at least 2 parts: a combustion chamber, where the freeing of the chemical energy occurs and its transformation to the heat energy of the gases, and a propulsive nozzle, where the heat energy, when the gases efflux the nozzle at a great speed, transforms to velocity energy, which, as a result, produces thrust
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Lesson 6

AIRCRAFT WEAPONS

aircraft weapons	авиационное вооружение
air-to-air weapon	управляемая ракета класса «воздух–воздух»
air-to-ground weapon	ракета класса «воздух–земля»
rocket	неуправляемая авиационная ракета
missile	управляемая ракета
Royal Air Force	Королевские военно-воздушные силы Великобритании
be equipped with	оснащаться
fixed-wing reconnaissance aircraft	самолет-разведчик с неизменяемой геометрией крыла
revolver cannon	револьверная пушка
(un)guided bomb	(не)управляемая бомба
fit with	снаряжаться (напр., фугасной боевой частью)
high-explosive warhead	фугасная боевая часть
short-range missiles	ракета малой дальности
medium-range missiles	ракета средней дальности
long-range missiles	ракета большой дальности
successor	следующий вариант

Paveway II LGB	управляемая авиационная бомба «Пейвуэй» с лазерной системой наведения
AIM-9X Sidewinder	«Сайдвиндер»

I. Найдите в тексте и переведите словосочетания:

Be classified as; be equipped with a wide variety of weapons; armed with machine guns; be unguided or guided by lasers; rockets fitted with a kinetic energy penetrator; which relies on its kinetic energy to destroy armoured targets; be divided into the following categories.

II. Найдите в тексте эквиваленты словосочетаний:

Подразделяться на; оснащаться в зависимости от назначения; вооружаться пулеметами или же не иметь вооружения вовсе; наводиться по лазерному лучу; уничтожать бронированные цели благодаря своей кинетической энергии; подразделяться на следующие категории; быть обнаруженным посредством пассивного или активного радиолокационного самонаведения.

III. Перевести устно на слух по абзацам:

Aircraft weapons of the Royal Air Force

Aircraft weapons can generally be classified as air-to-air and air-to-ground weapons according to their target, and as bombs, rockets, missiles and guns according to function. The aircraft of the Royal Air Force can be equipped with a wide variety of weapons depending on their purpose.

Most non-combat aircraft of the RAF are either armed with machine guns (support helicopters), or do not have any weapon system at all (fixed-wing reconnaissance, transport or refueling aircraft).

The weapons used by the RAF are:

1. Aircraft guns such as Mauser 27mm and Aden 30mm revolver cannon and M60D machine gun.

2. Bombs, which can be unguided (for example 1000lb and 540lb General Purpose Bombs) or guided by lasers or satellites (Paveway II LGB and its successor Paveway III LGB bombs).



Pic. 1. Paveway II LGB

3. Rockets fitted with either a high-explosive warhead for attack on lightly protected constructions and ships, or a kinetic energy penetrator, which contains no explosives, but relies on its kinetic energy to destroy armoured targets.



Pic. 2. AIM-9X Sidewinder

4. Missiles. The missiles used by the RAF can be both air-to-air and air-to-ground and can be further divided into the following categories: short-range missiles (Sidewinder), medium-range missiles (Skyflash), long-range missiles (Meteor, Storm Shadow).

IV. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Вооружение самолетов и вертолетов можно разделить на пушечное и ракетное, последнее, в свою очередь, делится на системы «воздух–воздух» и «воздух–поверхность», а также на управляемые ракеты и неуправляемые ракетные снаряды.

Рассмотрим более подробно новейший образец пушечного вооружения самолетов королевских ВВС – пушку GAU-22/A Equaliser, которая представляет собой четырехствольный вариант 25-миллиметровой авиационной пушки GAU-12/U Equaliser с вращающимся блоком стволов. Она устанавливается на AV-8B Harrier II и ганшип AC-130U «Spooky». Новая пушка сконструирована на базе GAU-12, но количество стволов сократилось с пяти до четырёх, что позволило уменьшить массу на 20 килограмм, а габариты – на 20%. Выросла и точность стрельбы, а подвесной контейнер с боекомплектом на 220 снарядов закреплён под фюзеляжем в задней части самолёта. Скорострельность стрельбы достигает 2 700–3 300 выстрелов в минуту. GAU-22/A совершает 50 выстрелов в секунду, так что весь запас патронов пушка расходует довольно быстро и с inferнальным шумом. Компания General Dynamics Ordnance and Tactical Systems также разработала пушечную систему внутренней установки для традиционного варианта F-35A, предназначенного для Королевских ВВС, и съёмный пушечный блок Missionised Gun System для варианта F-35B с укороченным взлетом и посадкой и палубного варианта F-35C, предназначенных для базирования на новейших авианосцах типа «Квин Элизабет». Установка включает спиральный беззвеньевого механизм питания с 220 25-миллиметровыми снарядами. Оба варианта пушки GAU-22/A прошли критический

анализ конструкции в июле 2005 г., и первый экземпляр был изготовлен в январе 2006 г. Первые стрельбовые испытания прошли в феврале этого же года.

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

1. The firing control equipment includes complicated electronic and electromechanical devices capable of computing the correct lead or releasing point in a fraction of a second.

2. The gunnery system of a modern fighter plane consists of the fixed forward firing 20 mm automatic aerial guns, gun accessories, gun control systems and a computing sight.

3. Gun charging and firing are accomplished from the cockpit with the switches located on the armament panel and control stick grip.

4. An aircraft gun consists of seven major components: gun barrel, receiver, recoil mechanism, gas mechanism, breechblock, buffer assembly and a charger. During the process of firing, chambering a round, closing and opening the breech, extracting an empty case and management of the recoil and counter recoil actions is conducted automatically.

5. Aircraft gun armament consists of air guns and machine guns with ammunition and sighting systems used on aircraft. The main characteristics of air guns are as follows: calibre 20-45 mm, firing rate 3 000-6 000 rpm, muzzle velocity 1 000-1 100 mps, effective range of fire up to 2 000 meters.

6. According to design, modern air guns are divided into three main groups: single barrel, revolver type and unit type.

7. The air guns are designated to engage ground and air targets. They are usually fired electrically. An air gun fired continuously when there is ammunition and the electric circuit is closed. The gun is equipped with a pneumatic loading mechanism, which operates the breechblock, chambers a round, clears the chamber in case of misfire and puts on the safety after firing.



Pic. 3. GAU-22/A

VI. Выступите в роли переводчика:

<p>На данный момент существует огромное множество образцов авиационного вооружения. Какое определение мы можем дать этой группе?</p>	<p>We can say that aircraft armament is an assembly of complexes, systems, components, and equipment, hosted on an aircraft, designed to deliver combat effect on enemy. Basically it includes aircraft guns, rockets and missiles, bombs, assault-transferring and rescuing equipment, sights, weapon-aiming systems and complexes.</p>
<p>Какие управляемые ракеты класса «воздух–воздух» ближнего боя находятся на вооружении Королевских ВВС?</p>	<p>One such missile is the American air-air infra-red homing head missile AIM-9 Sidewinder. Since being brought into service, it has been continually modified.</p>

<p>Какие управляемые ракеты класса «воздух–воздух» ближнего боя находятся на вооружении Королевских ВВС?</p>	<p>Up to the present moment, its modifications are widely used by the Air Forces of many countries.</p>
<p>Что вам известно об управляемых бомбах?</p>	<p>Guided bombs represent one of the classes of aircraft guided armaments. It poses an aircraft bomb fitted with a control and guidance system. For example, laser guided bomb, which uses a device, illuminating a laser ray to guide the bomb on its target.</p>

Lesson 7

FLEET AIR ARM

Fleet Air Arm	авиация военно-морских сил
vital element	жизненно важный элемент
To be embarked	находиться на борту (авианосца)
pitching deck	взлетная палуба
maritime aviation	морская авиация
land-locked	окружённый со всех сторон сушей
Maritime environment	обстановка действий на море
counter-piracy	противодействие пиратству
counter-narcotics	борьба с наркоторговлей
contingent commitments	потенциальные обязательства
rotary wing aircraft	винтокрылый летательный аппарат
Anti-Submarine Warfare	противолодочная борьба
Littoral Manoeuvre	операции в прибрежной зоне
maritime security	морская безопасность
Joint Combat Aircraft Force	соединение универсальных боевых самолётов
carrier-based aircraft	палубная авиация
naval helicopter	вертолёт военно-морских сил
aviation-capable ship	авианесущий корабль
search and rescue (SAR)	поисково-спасательные операции
transport (COD (carrier on-board delivery))	доставка грузов на корабль по воздуху

Catapult Assisted Take Off But Arrested Recovery (CATOBAR)	катапультный взлет и посадка с помощью аэрофинишера
Short Take Off and Vertical Landing (STOVL)	укороченный взлёт и вертикальная посадка
ski-jumps	прыжковый взлёт
Vertical Take Off And Landing (VTOL)	вертикальный взлёт и посадка
Short Take Off But Arrested Recovery (STOBAR)	укороченный взлёт и посадка с помощью аэрофинишера
Unassisted takeoff	взлёт без помощи реактивной катапульты
flying speed	взлётная скорость

I. Найдите в тексте и переведите словосочетания:

Influence areas of the globe over land and sea; without a reliance on land based support; to overcome the specific challenges that the sea can create; quickly respond to events anywhere in the world; flying an aircraft from a ship presents unique challenges; based on modern aircraft operated by experts in the maritime environment; to conduct Anti-Submarine Warfare and Littoral Manoeuvre.

II. Рекомендуются для устного перевода на слух по предложениям:

Из брошюры королевских ВМС об авиации военно-морских сил.

FLEET AIR ARM

What Is the Fleet Air Arm?

The Fleet Air Arm operates all the Royal Navy's aircraft.

- The combination of high speed aircraft operating from ships means that, through the Royal Navy, the UK can influence areas of the globe over land and sea where we otherwise would have no presence.
- The Fleet Air Arm is vital element for many of the wide and

varied roles undertaken by the Royal Navy, these range from humanitarian operations, or search and rescue around the coast of the UK, through to securing the seas, fighting terrorism and landing troops onto hostile shores.

- The Fleet Air Arm delivers air power where it is needed without a reliance on land based support.

Integrated

- Helicopters and ships work in unison to achieve greater results, on operations aircraft are embarked everyday giving a vessel an ability to have a greater effect over a larger area.

- Experts in operating aircraft from ships, Fleet Air Arm specialists are able to overcome the specific challenges that the sea can create, whether this be fixing aircraft in a storm, landing on a pitching deck, or simply operating alone, miles from their land base.

Efficient

- Aircraft embark with a dedicated team of specialist sailors, these men and women enable the Fleet Air Arm to maintain very high levels of aviation availability despite being miles from the nearest support.

- Operating from ships, aircraft are forward deployed globally, this means that the UK can quickly respond to events anywhere in the world.

- The Fleet Air Arm is primarily a maritime aviation asset, however, the Royal Navy is a flexible force and Fleet Air Arm assets have played a significant role over all terrain, most notably in land-locked Afghanistan.

Assured

- The mobility of ships allows us to act at a time and place of our choosing without relying on the permission of foreign governments to do so.

- Flying an aircraft from a ship presents unique challenges in order that we prevail in some of the most inhospitable environments in the world. The Fleet Air Arm can act globally because we know these challenges and have the experience to overcome them.



Pic. 1. Carrier-based helicopters

- The UK is committed to the modern Fleet Air Arm capable to react to the challenges of the future; this is based on modern aircraft operated by experts in the maritime environment.

Our present

Today's Fleet Air Arm is a highly efficient, lean manned, well oiled fighting arm of the Royal Navy operating a variety of different aircraft and deployed worldwide supporting UK defence and security interests. The Fleet Air Arm is inherently flexible and Naval aircraft fulfil a wide range of roles from counter-piracy and counter-narcotics operations at sea, to land based operations in Afghanistan and Oman and UK Search and Rescue and contingent commitments. The Fleet Air Arm can-do culture and ethos has developed over years of experience of operating in the unique and challenging maritime environment and is underpinned by a highly efficient safety and assurance system.

Our future

The Fleet Air Arm will remain a vital part of the ability of the UK's armed forces to act globally at a time and a place of our Government's choosing.



Pic. 2. F-35 on the Queen Elizabeth Class Carrier

As part of the Future Force structure, the Fleet Air Arm will transition from an ageing fleet of Lynx and Sea King rotary wing aircraft, to operate a world leading fleet of Merlin Mk 2 and 4 to conduct Anti-Submarine Warfare and Littoral Manoeuvre respectively. Wildcat will be introduced to retain the ability to strike at sea, either for war-fighting or when engaged in maritime security.

The Fleet Air Arm will lead the introduction of the Queen Elizabeth Class Carriers into Service and, alongside the RAF, will be a key part of the Joint Combat Aircraft Force. Innovation remains a hallmark and the Fleet Air Arm will continue to develop Maritime Unmanned Air Vehicles to support future Operations.

Source: <https://www.royalnavy.mod.uk/>, Fleet Air Arm.

III. Ответьте на вопросы:

1. What Is the Fleet Air Arm?
2. What roles does Fleet Air Arm undertake?
3. What are Fleet Air Arm specialists able to do?

4. What does the ability of operating aircraft from ships mean for the UK?

5. What are special aspects of today's Fleet Air Arm?

6. What transitions are planned for the Future Force structure?

IV. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Carrier-based aircraft

Carrier-based aircraft are military aircraft designed specifically for operations from aircraft carriers. The term is generally applied only to fixed-wing aircraft, as naval helicopters are able to operate from a wider variety of aviation-capable ships. Carrier-based aircraft must be relatively sturdy to withstand demanding carrier operations. They must be able to launch in a short distance and be sturdy enough to withstand the often abrupt forces associated with launching and recovering from a pitching deck and commonly have mechanisms to fold the wings to allow more to be carried on board. These aircraft are designed for many purposes including air-to-air combat, surface attack, anti-submarine warfare (ASW), search and rescue (SAR), transport (COD), weather observation, reconnaissance and airborne early warning and control (AEW&C) duties.

Types

Modern carrier-based aircraft are built in mainly three different versions to suit the needs of its various users. Terms are those used currently by the U.S. Navy.

Catapult Assisted Take Off But Arrested Recovery

CATOBAR is a system used for the launch and recovery of aircraft from the deck of an aircraft carrier. Under this technique, aircraft launch using a catapult-assisted take off and land (recover) on the ship using arresting wires. Although this system is more costly than al-

ternative methods, it provides greater flexibility in carrier operations, since it allows the aircraft to operate with higher payloads. Ships with CATOBAR currently include: the U.S. Nimitz class, and USS Enterprise (CVN-65) with the F-18 series, France's Charles De Gaulle with Rafales, and Brazil's Nae São Paulo with A-4 Skyhawks.

The use of catapults allows an aircraft carrier to launch large fixed-wing aircraft. For example, the U.S. Navy launches its E-2 Hawkeye AEW aircraft and C-2A Greyhound cargo aircraft with catapults.

Short Take Off and Vertical Landing

STOVL takeoffs are accomplished with “ski-jumps”, instead of a catapult. STOVL use usually allows aircraft to carry a larger payload as compared to during VTOL use, while avoiding the complexity of a catapult. The best known example is the Hawker Siddeley Harrier Jump Jet, despite being capable of VTOL takeoffs, is usually operated as a STOVL aircraft to increase its fuel and weapons load.

Short Take Off But Arrested Recovery

STOBAR is a system used for the launch and recovery of aircraft from the deck of an aircraft carrier, combining elements of both STOVL and CATOBAR. Aircraft launch under their own power using a ski-jump to assist take-off (rather than using a catapult). These are conventional aircraft however and require arresting wires to land on the ship. The Russian Navy aircraft carrier Admiral Kuznetsov operated the Su-33, in this manner. Another will be the Indian Vikramaditya and the future Vikrant class aircraft carrier; both are likely to operate MiG-29Ks.

Unassisted takeoff

Prior to the increase in aircraft weights experienced during World War II, most carrier aircraft launched under their own power, but required assistance in stopping. Catapults were installed but were used

only when the ship was stationary or adequate wind over the deck could not be arranged by sailing into the wind. Even aircraft as large as the North American B-25 Mitchell were launched in this manner. This was possible because the ships speed of nearly 20 knots, combined with a low takeoff speed allowed the aircraft to gain flying speed in a very short distance. The most extreme version of this was the battleship platforms used during the 1920s when small fighters were launched from a platform only a few dozen feet long.

Some STOL aircraft, such as the North American Rockwell OV-10 Bronco, have been operated from aircraft carriers and amphibious assault ships in this manner more recently, but this is no longer common practice.

V. Выступите в роли переводчика:

<p>Что из себя представляет палубная авиация и каковы ее особенности?</p>	<p>Carrier aviation is a branch of Navy aviation able to take off and land on an aircraft carrier. Accordingly, the term “carrier plane” means a carrier-based airplane. As broadly understood there is a term “ship-based aviation” – a subdivision of the Navy aviation that is based on auxiliary ships. That is the term “ship-based aircraft” may mean any plane or helicopter employed somehow on a ship</p>
<p>Какую технику включает в себя палубная авиация и в чем ее разница с техникой берегового базирования?</p>	<p>The carrier aviation includes: according to tactical employment: assault planes, fighter jets, antisubmarine planes, reconnaissance planes, early-warning aircraft, EW aircraft; flying tankers etc. Also there are carrier-based helicopters (ASW, transport, attack and other purpose) and drones.</p>

Какую технику включает в себя палубная авиация и в чем ее разница с техникой берегового базирования?	A carrier plane can have some features different from a shore-based aircraft: improved pilot view, folding parts (usually wings); retractable tail hook; strengthened landing gear
Чем самолеты вертикального взлета и посадки, зачастую используемые на авианосцах, отличаются от обычных самолетов?	A vertical take-off-and-landing airplane is a plane capable to take off and land with zero horizontal speed, using upward thrust of the engine. The fundamental distinction from a rotary wing aircraft that in horizontal flight with cruising speed the lift is created by fixed wing the same as on a conventional plane

Lesson 8

MISSILES CLASSIFICATION

rocket propulsion	ракетная тяга
jet-propelled	реактивный
rearward ejection of matter	выброс вещества в обратном направлении
propulsive jet of gases	реактивная струя газов
solid or liquid propellants	твердое или жидкое топливо
turbojet system	турбореактивный двигатель
pulse-jet system	пульсирующий воздушно-реактивный двигатель
ramjet system	прямоточный воздушно-реактивный двигатель
oxidizer	окислитель
medium	(окружающая) среда
oxygen content of the air	содержание кислорода в воздухе
air-breathing	воздушно-реактивный
free-flight missile	неуправляемая ракета
rocketry	ракетостроение
air-to-air missile	ракета класса «воздух–воздух»
short-range air-to-air missile (SRAAM)	ракета класса «воздух–воздух» ближнего действия
within-visual-range air-to-air missile (WVRAAM)	ракета класса «воздух–воздух» для стрельбы на дальность прямой видимости

“dogfight” missile	ракета воздушного боя
agility	маневроспособность
heat-seeking missile	ракета с тепловой головкой самонаведения
medium-range missile air-to-air missile (MRAAM)	ракета класса «воздух–воздух» средней дальности
long-range missile air-to-air missile (LRAAM)	ракета класса «воздух–воздух» большой дальности
beyond visual range air-to-air missile (BVRAAM)	ракета класса «воздух–воздух» для поражения целей за пределами прямой видимости
radar guidance	радиолокационное наведение
inertial guidance	инерциальная система наведения
homing sensor	датчик системы самонаведения
air-to-surface missile (ASM)	управляемая ракета класса «воздух–поверхность»
air-to-ground missile (AGM)	управляемая ракета класса «воздух–земля»
unpowered guided glide bomb	управляемая планирующая бомба
laser guidance	лазерное наведение
infrared guidance	инфракрасное наведение
optical guidance	оптическое наведение
satellite guidance	спутниковое наведение
passive radar or active radar homing	пассивное и активное радиолокационное наведение
standoff distance	дальность пуска ракеты без входа в зону поражения ПВО
fire-and-forget	«выстрелил и забыл»
anti-ship missile	противокорабельная ракета
Lock On After Launch	захват цели после пуска ракеты

I. Найдите в тексте и переведите словосочетания:

Used broadly to describe a variety of jet-propelled missiles; to consist of the combustion products of solid or liquid propellants; to include turbojet, pulse-jet, and ramjet systems; to be capable of being guided or directed to a target after having been launched; to be powered by one or more rocket motors; to maintain higher average speed across engagement envelope; to rely upon radar guidance; to depend on the type of target; to be launched from a distance; to be launched over the horizon.

II. Найдите в тексте эквиваленты словосочетаний:

Являться следствием выброса вещества в обратном направлении; включать в себя турбореактивный, пульсирующий воздушно-реактивный и прямоточный воздушно-реактивный двигатели; топливо и окислитель; зависеть от содержания кислорода в воздухе; ракета, запускаемая с самолета, с целью уничтожения другого самолета; использовать датчик системы самонаведения.

III. Перевести устно на слух по абзацам:

Missiles classification

Rocket and missile system, any of a variety of weapons systems that deliver explosive warheads to their targets by means of rocket propulsion. Rocket is a general term used broadly to describe a variety of jet-propelled missiles in which forward motion results from reaction to the rearward ejection of matter (usually hot gases) at high velocity. The propulsive jet of gases usually consists of the combustion products of solid or liquid propellants. In a more restrictive sense, rocket propulsion is a unique member of the family of jet-propulsion engines that includes turbojet, pulse-jet, and ramjet systems. The rocket engine is different from these in that the elements of its propulsive jet (that is, the fuel and oxidizer) are self-contained within the vehicle. Therefore, the thrust produced is independent of the medium through which the vehicle travels, making the rocket engine capable of flight beyond the atmosphere or propulsion underwater. The turbojet, pulse-

jet, and ramjet engines, on the other hand, carry only their fuel and depend on the oxygen content of the air for burning. For this reason, these varieties of jet engine are called air-breathing and are limited to operation within the Earth's atmosphere. A rocket engine is a self-contained (i.e., non-air-breathing) propulsion system of the type described above, while the term rocket refers to any free-flight (unguided) missile of the types used since the beginning of rocketry. A guided missile is broadly any military missile that is capable of being guided or directed to a target after having been launched.

An air-to-air missile (AAM) is a missile fired from an aircraft for the purpose of destroying another aircraft. AAMs are typically powered by one or more rocket motors, usually solid fueled but sometimes liquid fueled. Ramjet engines, as used on the Meteor (missile) are emerging as propulsion that will enable future medium-range missiles to maintain higher average speed across their engagement envelope. Air-to-air missiles are broadly put in two groups. Those designed to engage opposing aircraft at ranges of less than 30 km are known as short-range or "within visual range" missiles (SRAAMs or WVRAAMs) and are sometimes called "dogfight" missiles because they are designed to optimize their agility rather than range. Most use infrared guidance and are called heat-seeking missiles. In contrast, medium- or long-range missiles (MRAAMs or LRAAMs), which both fall under the category of beyond visual range missiles (BVRAAMs), tend to rely upon radar guidance, of which there are many forms. Some modern ones use inertial guidance and/or "mid-course updates" to get the missile close enough to use an active homing sensor. The concepts of air-to-air missiles and surface-to-air missiles are very closely related, and in some cases versions of the same weapon may be used for both roles.

An air-to-surface missile (ASM) or air-to-ground missile (AGM) is a missile designed to be launched from military aircraft at targets on land or sea. There are also unpowered guided glide bombs not considered missiles. The two most common propulsion systems for air-to-surface missiles are rocket motors, usually with shorter range,

and slower, longer-range jet engines. Guidance for air-to-surface missiles is typically via laser guidance, infrared guidance, optical guidance or via satellite guidance signals. The type of guidance depends on the type of target. Ships, for example, may be detected via passive radar or active radar homing, less effective against multiple, small, fast-moving land targets. A major advantage of air-to-surface missiles for ground attack by aircraft is the standoff distance they provide: missiles can be launched from a distance without coming within range of the target's air defences. Most air-to-surface missiles are fire-and-forget from a standoff distance, allowing the attacker to withdraw without approaching further after launch. Some missiles (typically cruise missiles or anti-ship missiles) have long enough range to be launched over the horizon, finding the target autonomously.

Sources: Rocket and missile system, <https://www.britannica.com/>;
Air-to-air missile, <https://en.wikipedia.org/>

IV. Ответьте на вопросы:

1. What is defined by the term “missile system”?
2. What is special about turbojet, pulse-jet, and ramjet systems in comparison with a rocket engine?
3. By what name are missiles which designed to engage opposing aircraft at ranges of less than 30 km known?
4. How are missiles with infrared guidance called?
5. What missiles are designed to be launched from military aircraft at targets on land or sea?
6. What is the typical guidance for air-to-surface missiles?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

ASRAAM air-to-air missile. ASRAAM is in service with the Royal Air Force as its Within Visual Range (WVR) Dominance weapon. The weapon is also in operational service with the Royal Australian Air Force on its F/A-18 Hornet.

In WVR air combat, the ability to strike first is vital. A pilot engaging an enemy needs a missile that reacts more rapidly than ever

before with the speed and agility to maximise the probability of a kill, regardless of evasive target manoeuvres or the deployment of counter-measures. ASRAAM has proven this capability.



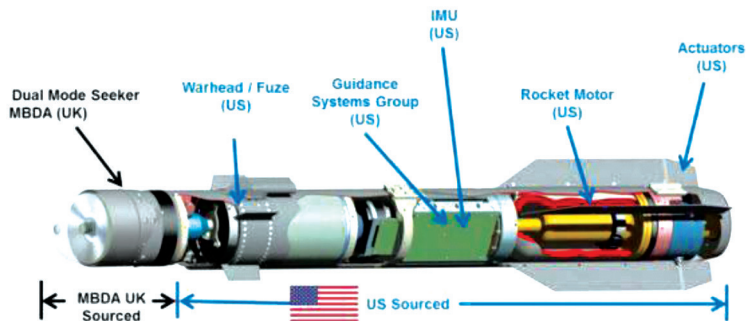
Pic. 1. ASRAAM air-to-air missile

ASRAAM accepts target information via the aircraft sensors, such as the radar or helmet mounted sight but can also act as an autonomous infrared search and track system. The RAAF has demonstrated successful 'over the shoulder' firing in Lock On After Launch (LOAL) mode against target drones that were behind the wing-line of the launch aircraft.

Already fully integrated with proven reliability on Typhoon, Tornado and F/A-18, ASRAAM is also being integrated onto the F-35 Lightning II. Proven capability demonstrated by firings from a range of aircraft, including: F-16, F/A-18, Tornado F3, Tornado GR4 and Typhoon aircraft.

Brimstone air-to-surface ground-attack missile. Brimstone provides a combat proven, low collateral, close air support weapon of-

fering to the fast jet operator the unique capability of engaging a wide range of target types, including fast moving vehicles / vessels in both land and naval environments and in both direct and indirect modes.



Pic. 2. Brimstone air-to-surface ground-attack missile

The latest generation Brimstone builds upon the successful Brimstone Urgent Operational Requirement (UOR) which deployed the weapon into front line operations with the RAF.

Operationally deployed in the Afghanistan, Libya conflicts, Brimstone has proved to be the weapon of choice with its ability to perform surgical strikes in time critical missions with a true day / night capability.

Sources: ASRAAM, <https://www.mbda-systems.com/>; Brimstone, <https://www.mbda-systems.com/>.

VI. Выступите в роли переводчика:

Можете ли вы рассказать, в чем заключаются особенности современных образцов боевых ракет?	One of the features of modern weaponry is that there is a variety of designs of combat missiles. Modern armies' rockets vary in terms of designation, trajectory, design, method of control, engine type, target location, launch site and other characteristics
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<p>Мы знаем, что существуют ракеты класса «воздух–земля», «воздух–воздух» и т.д. По какому признаку идет разделение ракет на классы?</p>	<p>The first indication of a missile class is the launch site and location of a target. “Surface” means that the launch sites are positioned on the ground, a battleship or a submarine, whereas “Air” means that the launch is executed from an aircraft – a plane or a helicopter. The same principle goes for the target location.</p>
<p>Задачей каких ракет является уничтожение воздушных целей?</p>	<p>These missiles are called surface-to-air missiles, which is self-explanatory. They play a leading role in every modern air defence system. They are basis of the firepower. The surface-to-air missiles are designated to engage air targets: air-to-surface and surface-to-surface missiles, planes, cruise missiles as well as the ballistic missiles of the same class. All the surface-to-air missiles have the same mission – delivery of the payload to a particular point and its detonation in order to destroy an enemy air assault weapon.</p>

Lesson 9

CRUISE MISSILES

cruise missile	крылатая ракета
low-flying strategic guided missile	стратегическая управляемая ракета низкого профиля полета
conventional warhead	боевая часть с обычным снаряжением; неядерная боевая головка
radar cross section	эффективная поверхность рассеяния радиолокационных волн; радиолокационное сечение
hug the ground	совершать полет с огибанием рельефа местности
guidance system	система наведения
payload	полезный груз
be housed in	размещаться в
airframe	планер летательного аппарата
empennage	хвостовое оперение
low altitude	малая высота над уровнем моря
subsonic or supersonic	дозвуковой или сверхзвуковой
<u>inertial navigation</u>	инерциальная аэронавигация
TERCOM (Terrain Contour Matching)	система отслеживания рельефа местности ТЕРКОМ
<u>satellite navigation</u>	спутниковая навигация
hypersonic	гиперзвуковой
<u>Mach</u>	число Маха

ramjet engines	прямоточный воздушно-реактивный двигатель
DSMAC (digital scene matching area correlator)	цифровой площадной коррелятор картографической программы с реальным изображением рельефа местности
high-value targets	приоритетная цель; цель особой важности
deep strike weapon	оружие глубинного поражения (объектов)
hardened bunkers	противоатомное убежище
key infrastructure	ключевой объект инфраструктуры
INS (inertial navigation system)	инерциальная навигационная система
GPS (global positioning system)	глобальная система определения координат; GPS
terrain referencing	коррекция по карте рельефа местности
infrared seeker	инфракрасная головка самонаведения (ИКГСН)
collateral damage	сопутствующий (непреднамеренный) ущерб
Eurofighter Typhoon	Еврофáйтер Тайфúн
Rafale	«Рафаль»
Mirage 2000	«Мираж» 2000
Tornado	«Торнадо»
operational service	эксплуатация, боевая служба
operational advantage	эксплуатационные преимущества
high survivability	высокая степень живучести
stand-off range	дальность стрельбы
low observability	малозаметность
pinpoint terminal accuracy	высочайшая точность

IR seeker	тепловизионный прибор наблюдения
Automatic Target Recognition (ATR)	автоматическое распознавание целей
terminal effectiveness	конечная эффективность
final dive	пикирование на конечном участке траектории
airburst	подрыв в воздухе

I. Найдите в тексте и переведите словосочетания:

Low-flying strategic guided missile; capable of carrying either a nuclear or a conventional warhead; to tend to be propelled by jet engine; vary across missiles; to travel faster than the speed of sound, usually using ramjet engines; to attack relatively high-value targets such as ships, command bunkers, bridges and dams; to permit accurate attacks.

II. Найдите в тексте эквиваленты словосочетаний:

Предшественник крылатой ракеты; способная нести ядерную или обычную боеголовку; огибать рельеф местности; состоять из системы наведения, полезного груза и авиационной силовой установки; оснащаться различными навигационными системами; лететь на скорости по меньшей мере пяти скоростей звука; взлетный вес около 1,500 килограмм; примерно того же размера и веса.

III. Рекомендуется для устного перевода на слух по абзацам с заметками:

Cruise missiles

The cruise missile is a type of low-flying strategic guided missile. The German V-1 missile used in World War II was a precursor of the cruise missile, which was developed by the United States and the Soviet Union in the 1960s and 1970s. Capable of carrying either a nuclear or a conventional warhead, the cruise missile was designed to have a very low radar cross section and to hug the ground while traveling at a relatively slow speed to its target.

Cruise missiles generally consist of a guidance system, payload, and aircraft propulsion system, housed in an airframe with small wings and empennage for flight control. Payloads usually consist of a conventional warhead or a nuclear warhead. Cruise missiles tend to be propelled by jet engine, with turbofan engines in particular being preferred due to their greater efficiency at low altitude and subsonic speed.

Cruise missiles can be categorised by size, speed (subsonic or supersonic), and range, and whether launched from land, air, surface ship, or submarine. Often versions of the same missile are produced for different launch platforms; sometimes air- and submarine-launched versions are a little lighter and smaller than land- and ship-launched versions.

Guidance systems can vary across missiles. Some missiles can be fitted with any of a variety of navigation systems (Inertial navigation, TERCOM, or satellite navigation). Larger cruise missiles can carry either a conventional or a nuclear warhead, while smaller ones carry only conventional warheads.

Hypersonic. A hypersonic speed cruise missile would travel at least five times the speed of sound (Mach 5)

Supersonic. These missiles travel faster than the speed of sound, usually using ramjet engines. The range is typically 100–500 km, but can be greater. Guidance systems vary.

Long-range subsonic. The United States, Russia, India, United Kingdom, Iran, South Korea, Turkey, Israel, China and Pakistan have developed several long-range subsonic cruise missiles. These missiles have a range of over 1,000 kilometres (620 mi) and fly at about 800 kilometres per hour (500 mph). They typically have a launch weight of about 1,500 kilograms (3,300 lb) and can carry either a conventional or a nuclear warhead. Earlier versions of these missiles used inertial navigation; later versions use much more accurate TERCOM and DS-MAC systems. Most recent versions can use satellite navigation.

Medium-range subsonic. These missiles are about the same size and weight and fly at similar speeds to the above category. Guidance systems vary.

Short-range subsonic. These are subsonic missiles which weigh around 500 kilograms (1,102 lb) and have a range of up to 300 km (190 mi).

The most common mission for cruise missiles is to attack relatively high-value targets such as ships, command bunkers, bridges and dams. Modern guidance systems permit accurate attacks.

Source: Cruise missile, <https://www.britannica.com/>; Cruise missile, <https://en.wikipedia.org/>

IV. Ответьте на вопросы:

1. What's for was the cruise missile designed?
2. What do cruise missiles usually consist of?
3. For which platforms are versions of the same cruise missile designed?
4. Which guidance systems do cruise missiles have?
5. What kinds of cruise missiles do you know?
6. What is the most common mission for cruise missiles?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Storm Shadow/SCALP

Storm Shadow/SCALP is an air-launched long range, conventionally armed, deep strike weapon, designed to meet the demanding requirements of pre-planned attacks against high value fixed or stationary targets such as hardened bunkers and key infrastructure. Capable of being operated day and night in all weathers, the weapon offers a high precision mission planned deep strike capability. Storm Shadow/ SCALP's exceptional accuracy is due to its advanced navigation system that combines INS, GPS and terrain referencing. After launch, the weapon descends to terrain hugging altitude to avoid detection. On approaching the target, its onboard infrared seeker matches the target image with the stored picture to ensure a precision strike and minimal collateral damage.

Platform Integration Storm Shadow/SCALP is operated from Eurofighter Typhoon, Rafale, Mirage 2000 and Tornado. It is in service with the Royal Air Force, the French Air Force, the Italian Air Force and a number of export countries and has seen operational service in Iraq, Libya and Syria.

Operational advantages

High survivability. Achieved through long stand-off range and low observability. Enemy ground-based air defence avoidance through sophisticated mission planning and long range. High levels of navigation accuracy through INS, GPS and Terrain Reference Navigation system.

Pinpoint terminal accuracy. Achieved through IIR seeker and Automatic Target Recognition (ATR).

Terminal effectiveness. Powered by high final dive and tandem warhead, precursor charge and a large explosive/kinetic energy penetrator. Warhead detonation options include airburst, impact and penetrative modes.

Source: Storm Shadow/SCALP, <https://www.mbda-systems.com/>

VI. Выступите в роли переводчика:

Какое определение мы можем дать крылатой ракете?	A cruise missile is an unmanned single-used drone whose trajectory is set by the airfoil lift, the engine thrust and gravity
Слово «крылатая» сразу же вызывает ассоциацию ракеты с самолетом. В чем же их отличия?	In comparison with planes the main merit of the cruise missile is the absence of a crew, which leads to size reduction and impedes target acquisition by the enemy. Due to its single use, the requirements for the endurance of the engine and other parts are less strict

<p>Какие крылатые ракеты стоят на вооружении Великобритании?</p>	<p>The British Armed Forces are equipped with the air-to-surface cruise missile Storm Shadow. It is a joint British-French design. It became fully operational in France at the end of December 2000. The missile entered service in 2002. It is equipped with an inertial guidance system, after launch the trajectory is calculated with an onboard computer. On the final stage of the flight the infra-red homing device is switched on for target acquisition. The first combat use of the missile was in Iraq in 2003 by the British Army.</p>
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Lesson 10

BALLISTIC MISSILES

ballistic missile	баллистическая ракета
proliferation	распространение
elliptical orbit	эллиптическая орбита
burnout	прекращение горения
solid or liquid propelled	твёрдотопливный и жидкостный
hybrid fuels	гибридное топливо (твёрдое жидкое топливо)
powered flight	полет с работающим двигателем; активный участок полета
to be deployed in silos	располагаться в шахтных пусковых установках
to be deployed on rail-mobile launcher	устанавливаться на железнодорожную мобильную пусковую установку
survivability	живучесть
Multiple Independent Reentry Vehicle (MIRV)	разделяющаяся головная часть
reentry vehicle	головная часть баллистической ракеты
to intercept	перехватывать
Intercontinental Ballistic Missile (ICBM)	межконтинентальная баллистическая ракета (МБР)

post-boost vehicle (PBV)	ступень разведения головной части
Close Range Ballistic Missile (CRBM)	баллистическая ракета ближней дальности (БРБД)
Short Range Ballistic Missile (SRBM)	баллистическая ракета малой дальности (БРМД)
Medium-Range Ballistic Missile (MRBM)	баллистическая ракета средней дальности (БРСД)
Intermediate-Range Ballistic Missile (IRBM)	баллистическая ракета промежуточной дальности
Submarine Launched Ballistic Missile (SLBM)	баллистическая ракета подводного пуска; баллистическая ракета подводной лодки (БРПЛ)
Air Launched Ballistic Missile (ALBM)	баллистическая ракета воздушного базирования (БРВЗ)
propulsion system	Двигательная / энергетическая установка
ballistic trajectory	баллистическая траектория; траектория свободного полета
eruption of water	водяной столб
to be deemed fit for use	быть признанным годным к использованию

I. Найдите в тексте и переведите словосочетания:

Means to rapidly and accurately deliver a lethal payload to a target; the ballistic missile follows an elliptical orbit around the center of the Earth; to be solid or liquid propelled; to be very accurately delivered to the desired target point; to carry Multiple Independent Reentry Vehicle (MIRVs) warhead; to have two or three stages with powerful liquid-propellant engines or solid propellant motors; to separate each of the stages in high velocities and under difficult atmospheric conditions; to be made up of three essential elements; initial conditions for the ballistic trajectory.

II. Найдите в тексте эквиваленты словосочетаний:

Баллистическая следует по эллиптической траектории; менее стабильны и более токсичны; совмещать в себе достоинства твердотопливных и жидкостных баллистических ракет; относительно сложны в поражении; повышать точность; обладать возможностью самостоятельного маневрирования; состоять из одной или более ступеней; технология, необходимая для отделения каждой из ступеней на больших скоростях.

III. Рекомендуются для устного перевода на слух по предложениям:

Ballistic Missiles

Ballistic missiles are means to rapidly and accurately deliver a lethal payload to a target. The lethal payload can include conventional explosives, biological, chemical or nuclear warhead. Ballistic missiles are very cheap, which makes their proliferation more likely and ensure that their numbers will be rising in the coming future.

Once its fuel has been consumed, the ballistic missile follows an elliptical orbit around the center of the Earth, defined strictly by the combination of velocity / flight angle at burnout and the Earth's gravity. Ballistic missiles can be solid or liquid propelled. Liquid propellants are relatively cheaper, but they are less stable (and so more difficult to store) and more toxic. Solid propellants are more expensive, but more easily maintainable and more stable. Hybrid fuels are under development combining benefits of solid- and liquid-propelled ballistic missiles.

By careful control and maneuvering of the missile during its powered flight, the payload can be very accurately delivered to the desired target point.

Operational ballistic missiles are deployed in silos, on submarines, surface ships, road- and rail-mobile launchers and aircraft. Mobile missiles are favored by many nations because they can be hidden, which greatly increases their survivability. They are also very mobile and relatively difficult to defend against.

Longer-range ballistic missiles can carry Multiple Independent Reentry Vehicle (MIRVs) warhead, which hold up to 10 reentry vehicles. Reentry vehicles reenter the Earth's atmosphere at very high velocities, on the order of 6-8 kilometers per second. Such a warhead is more difficult to intercept since we have 10 targets instead of one. Some countries also develop maneuverable reentry vehicles that could avoid defense and / or increase accuracy. Those are referred to as maneuvering reentry vehicles and have independent maneuvering capability.

Ballistic missiles are composed of one or more stages. Multiple-stage missiles, which are configured so that each stage has its own independent propulsion system, are used for longer range missions. Intercontinental ballistic missiles (ICBMs) typically have two or three stages with powerful liquid-propellant engines or solid propellant motors that propel the payload toward the target, as well as a post-boost vehicle (PBV) with a much smaller propulsion system. The technology needed to separate each of the stages in high velocities and under difficult atmospheric conditions is relatively sophisticated and difficult. That is why there are only few countries with intercontinental-range ballistic missile technology (e.g. Russia, China, and India).

Ballistic Missile Classes and Range

Ballistic Missiles are typically classified into the following categories:

Classification	Abbreviation	Range
Close Range Ballistic Missile	CRBM	50-300 km
Short Range Ballistic Missile	SRBM	300-1 000 km
Medium-Range Ballistic Missile	MRBM	1 000-3 000 km
Intermediate-Range Ballistic Missile	IRBM	3 000-5 500 km
Intercontinental Ballistic Missile	ICBM	> 5500 km
Submarine Launched Ballistic Missile	SLBM	Varies
Air Launched Ballistic Missile	ALBM	Varies

Classification of ballistic missiles

Missile components

All ballistic missiles are made up of three essential elements: a propulsion system, which provides the energy necessary to reach the target; a guidance system, which contains steering of the missile during powered flight and ensures the correct initial conditions for the ballistic trajectory; and the payload, which destroys the target.

Source: Ballistic Missile Basics, <https://missiledefenseadvocacy.org/>

IV. Ответьте на вопросы:

1. What can the lethal payload include?
2. What is the difference between solid and liquid propellants?
3. There are operational ballistic missiles deployed?
4. What are the benefits of using MIRVs?
5. How many stages do ballistic missiles usually have?
6. Why are there only few countries with intercontinental-range ballistic missile technology?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

The UGM-133 Trident II

The UGM-133 Trident II, also known as the Trident D-5, is a submarine-launched ballistic missile (SLBM) capable of carrying up to 12 nuclear warheads. First built in the 1980s, it is a vital component of both the American and British nuclear weapons programmes.

In 1983, Lockheed Martin were contracted to develop the missile, and, by 1987, they were launching it for the first time. Unfortunately, the initial launch was a failure, as the eruption of water that followed the missile rose higher than expected, causing the motor to ignite and bring the missile down. It was not until 1990 that the missile was eventually deemed fit for use - at which point it was quickly adopted by both the Americans and the British.



Pic. 1. UGM-133 Trident II

Today, Trident II missiles are carried by 14 US and 4 British submarines, with 24 missiles on each US vessel and 16 on each British. In the coming years, as a result of global nuclear disarmament agreements, these numbers are likely to fall.

The Trident II was built as an improvement on the Trident I C-4, a SLBM first deployed in 1979. It was designed to have greater accuracy (within a few feet) and range (7,000 miles) as well as being capable of carrying more and larger nuclear warheads. At 58.5 tonnes, it was also lighter than the C-4. Perhaps most interestingly, the Trident II is not dependent on a Global Positioning System (GPS), meaning that even in the case where all GPS systems were down, it would still be able to hit its intended target. Instead, the Trident II uses a stellar sighting guidance system, since the missile, when fired, heads first into space (with a top speed of 13,400mph), before re-entering the earth's atmosphere to reach its target.

The guidance system takes readings from the stars to figure out the missile's exact position.

Source: The UGM-133 Trident II, <http://large.stanford.edu/>

VI. Выступите в роли переводчика:

По какой причине баллистические ракеты получили именно такое наименование?	The missiles are called “ballistic” due to the fact that the majority of the flight goes along the ballistic trajectory when the missile is not guided.
На какие группы делятся баллистические ракета? Существует ли общая классификация?	In terms of operational use the ballistic missiles are classified as strategic and tactical. Often they are broken down according to range, even though there is no such commonly accepted classification. Different states and non-governmental experts use different breakdowns of the missiles according to the range
Как правило, баллистические ракеты оснащаются ядерной боевой частью. В чем же их преимущество перед стратегическими бомбардировщиками, несущими ракеты с ядерным зарядом?	Indeed, intercontinental and medium range missiles are often equipped with nuclear warheads and used as strategic ones. They reach the target much faster than planes and their warheads fly with a much higher speed, so they are very difficult to intercept even by modern ICBM defense systems.

Lesson 11

MISSILE GUIDANCE

attitude control system	система пространственной стабилизации
flight path control system	система управления траекторией полёта
pitch	тангаж
roll	крен
yaw	рыскание
to damp out fluctuations	гасить колебания
to deflect the missile	отклонять ракету
aero-dynamic loading	аэродинамическая нагрузка
the principle of feedback	принцип обратной связи
corrective adjustments	корректирующие регулировки
radio or radar beams	радиолуч или луч РЛС
an electromagnetic source	источник электромагнитного излучения
position reports	донесения о местонахождении
boost (phase)	разгонный этап
midcourse	маршевый участок траектории
terminal	конечный участок траектории полета
launching or initial phase	участок разгона или начальный участок (траектории полета)
to accelerate to flight speed	разгоняться до полетной скорости
external guidance signals	внешние сигналы управления

aerodynamic surfaces	аэродинамическая поверхность
airframe design	аэродинамическая компоновка
terminal guidance	наведение на конечном участке траектории полета
performance capabilities	технические возможности
acceleration	ускорение

I. Найдите в тексте и переведите словосочетания:

To consist of an attitude control system and a flight path control system; to determine the flight path necessary for target interception; to generate the orders to the attitude control system; to stabilize the missile in roll, pitch, and yaw; suitable for specific guidance purposes; to have some means of receiving “position reports”; to be called the launching or initial phase; to place the missile near the target; to be used for all three phases of guidance.

II. Найдите в тексте эквиваленты словосочетаний:

Состоять из системы пространственной стабилизации и системы управления траекторией полёта; определять траекторию полета, необходимую для перехвата цели; способная реагировать на сигналы управления; основываться на принципе обратной связи; сравнима с пилотом самолета; устанавливаться в ракету для создания приемника сигналов; разгоняться до полетной скорости при помощи ускорителя.

III. Рекомендуется для устного перевода на слух по предложениям:

Guidance and Control

Purpose and Function

Every missile guidance system consists of an attitude control system and a flight path control system. The attitude control system functions to maintain the missile in the desired attitude on the ordered flight path by controlling the missile in pitch, roll, and yaw. The attitude control system operates as an auto-pilot, damping out fluctuations that

tend to deflect the missile from its ordered flight path. The function of the flight path control system is to determine the flight path necessary for target interception and to generate the orders to the attitude control system to maintain that path.

It should be clear at this point that the concept of “Guidance and Control” involves not only the maintenance of a particular vehicle’s path from point A to B in space, but also the proper behavior of the vehicle while following the path. A missile that follows a prescribed path half the way to a target and then becomes dynamically unstable is then incapable of remaining upon the path (or else fails structurally due to aero-dynamic loading). Such a vehicle, in order to perform properly, must be “piloted” and capable of responding to control signals.

The operation of a guidance and control system is based on the principle of feedback. The control units make corrective adjustments of the missile control surfaces when a guidance error is present. The control units will also adjust the control surfaces to stabilize the missile in roll, pitch, and yaw. Guidance and stabilization corrections are combined, and the result is applied as an error signal to the control system.

Sensors

The guidance system in a missile can be compared to the human pilot of an airplane. As a pilot guides his plane to the landing field, the guidance system “sees” its target. If the target is far away or otherwise obscured, radio or radar beams can be used to locate it and direct the missile to it. Heat, light, television, the earth’s magnetic field, and Loran have all been found suitable for specific guidance purposes. When an electromagnetic source is used to guide the missile, an antenna and a receiver are installed in the missile to form what is known as a sensor. The sensor picks up, or senses, the guidance information. Missiles that are guided by other than electromagnetic means use other types of sensors, but each must have some means of receiving “position reports.”

The kind of sensor that is used will be determined by such factors as maximum operation range, operating conditions, the kind of information needed, the accuracy required, viewing angle, and weight and size of the sensor, and the type of target and its speed.

Phases of guidance

Missile guidance is generally divided into three phases - boost, midcourse, and terminal. These names refer to different parts of the flight path. The boost phase may also be called the launching or initial phase.

Boost Phase

Navy surface-to-air missiles accelerate to flight speed by means of the booster component. This booster period lasts from the time the missile leaves the launcher until the booster burns its fuel. In missiles with separate boosters, the booster drops away from the missile at burnout. The objective of this phase is to place the missile at a position in space from where it can either “see” the target or where it can receive external guidance signals. During the boost phase of some missiles, the guidance system and the aerodynamic surfaces are locked in position. Other missiles are guided during the boost phase.

Midcourse Phase

The second, or midcourse, phase of guidance is often the longest in both distance and time. During this part of the flight, changes may be required to bring the missile onto the desired course and to make certain that it stays on that course. During this guidance phase, information can be supplied to the missile by any of several means. In most cases, the midcourse guidance system is used to place the missile near the target, where the system to be used in the final phase of guidance can take over. In other cases, the midcourse guidance system is used for both the second and third guidance phases.

Terminal Phase

The last phase of missile guidance must have high accuracy as well as fast response to guidance signals. Missile performance becomes a critical factor during this phase. The missile must be capable of executing the final maneuvers required for intercept within the constantly decreasing available flight time. The maneuverability of the missile will be a function of velocity as well as airframe design. Therefore, a terminal guidance system must be compatible with mis-

sile performance capabilities. The greater the target acceleration, the more critical the method of terminal guidance becomes. In some missiles, especially short-range missiles, a single guidance system may be used for all three phases of guidance, whereas other missiles may have a different guidance system for each phase.

Source: Guidance and Control, <https://fas.org/>

IV. Ответьте на вопросы:

1. What is the purpose of the attitude control system?
2. On which principle is The operation of a guidance and control system based?
3. What can be used to locate the target If the it is far away or otherwise obscured?
4. Which categories is missile guidance generally divided into?
5. In which missiles the booster drops away from the missile at burnout?
6. What is the phase which is often the longest in both distance and time?

V. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

The (Oceanit-Ys/APL) Foveal Infrared Search and Track (FIRST) prototype is a dual channel cryogenic WFOV optical sensor system. FIRST provides multifaceted support for an airborne IR search and track and uses the unique Multi-target-tracking Optical Sensor-array Technology (MOST) sensor chip, which has been developed at MDA.

FIRST supports instantaneous field-of-view up to 90 degrees, with 360 degree surveillance supported with multiple sensor pods. FIRST provides: 500 Km detection, cueing for other NFOV sensors, robust kill assessment, special processing for early detection supports the entire missile engagement from initial detection to kill. Dual channels for LWIR / MWIR sensing, configurable for multiple missions and integration into multiple platforms required to support the BMDS.

The FIRST system includes provisions for merging radar data to significantly improve cueing accuracy, which will result in more reli-

able detection and more accurate tracking. The FIRST primary mission is tip-off and cueing for NFOV sensors. Kill assessment is also a primary mission. Additional support roles include special processing modes for potential discrimination metrics for boosting missiles.

VI. Выступите в роли переводчика:

Какие основные задачи решает система управления во время полета ракеты?	There are three main tasks of a guidance system: homing in on a target (navigation), stabilization in flight and fuel management
Что включает в себя процесс стабилизации полета?	The stabilization in flight is due to environmental and eternal perturbations and their compensation considering the limits of the missile design. The stabilization controller provides for the steady flight and structural integrity of the missile. The stabilization controller quality of implementation directly affects the maximum dimensions of the payload and possibilities for design optimization to reduce the weight
Система управления является одним из основных компонентов системы наведения управляемых ракет. Из чего она состоит?	The guidance system of modern ballistic missile is a multilevel control set with a complex hierarchic structure which is responsible for solving a row of command tasks including diagnosis and management of technical status of the missile system during operational readiness, calculation of the launch mission, control of preparation and execution of the launch

Lesson 12

MILITARY SPACE PROGRAM OF THE UK

National Security Capability Review	анализ возможностей системы национальной безопасности
National Security Strategy	стратегия национальной безопасности
Defence Secretary	министр обороны
Modernising Defence Programme (MDP)	программа перевооружения
the Command and Control of UK military space operations	управление военными космическими программами Великобритании
Space personnel	личный состав военно-космических сил
Joint Forces Command	командование объединённой группировки
Satellite Communications and Intelligence, Surveillance and Reconnaissance capabilities	спутниковые системы связи, разведки и наблюдения либо возможности спутниковой группировки (Великобритании) по связи, разведке и наблюдению

Air Command for Space Situational Awareness and Space Control capabilities	управление ВВС, ответственное за систему раннего предупреждения и управление космическими силами
operational plans	план боевых действий
space assets and interests	материальная часть космических сил и их задачи
contested environment	в условиях все возрастающего соперничества (в космосе)
space resilience	гибкость применения
space domain	космическое пространство
capability development	повышение квалификации
to derive benefit	извлекать пользу
Critical National Infrastructure	критическая национальная инфраструктура
to respond to threats and hazards	отвечать угрозам и вызовам

I. Найдите в тексте и переведите словосочетания:

In a period of increased complexity and risk; to strengthen our world-leading Armed Forces; a stable and affordable footing; to enhance the overall coherence and coordination of activity; the capabilities, skills and operational plans; to maximise the benefits of any space activities; taking into account both increased threats and new opportunities; international collaboration on civil space programmes.

II. Рекомендуются для устного перевода на слух по предложениям:

Из брошюры Министерства обороны Великобритании о военной космической программе Великобритании.

The 2018 National Security Capability Review concluded that we are in a period of increased complexity and risk. The challenges identified in the 2015 National Security Strategy have grown faster than anticipated, which is why the Defence Secretary initiated the Mod-

ernising Defence Programme (MDP) to strengthen our world-leading Armed Forces while putting Defence on a stable and affordable footing. Air Command has assumed responsibility for the Command and Control of UK military space operations, leading the development of a cadre of qualified and experienced Space personnel, and engaging internationally in support of these responsibilities. Leads for the management of space-enabled capabilities remain unchanged, although an important part of our future approach will be to enhance the overall coherence and coordination of activity across the Defence space enterprise. Joint Forces Command will continue to be responsible for Satellite Communications and Intelligence, Surveillance and Reconnaissance capabilities, and Air Command for Space Situational Awareness and Space Control capabilities.

Vision

To secure freedom of action in space, fully exploiting its military and civil potential.

Mission

To ensure that Defence has the capabilities, skills and operational plans to protect and defend its space assets and interests in an increasingly contested environment, working closely alongside the rest of Government, international partners and the private sector.

Strategic Objectives

Enhance space resilience and operational effectiveness. We need to be able to protect and defend our space interests, and we will develop the plans, capabilities, skills and relationships needed to do so. The nature of the threats, and the space domain itself, means that international cooperation will be central, and we should aim to maximise the benefits of any space activities we conduct to our allies and partners.

Optimise space support to the front line. We need to ensure that the armed forces can take full advantage of the opportunities offered by space-based technology. This means integrating space issues into a much wider range of activity than before, including operational planning, doctrine, capability development and training. We need to get

our focus and balance of investment in space capabilities right, taking into account both increased threats and new opportunities.

Support wider Government activities. The UK Space agency is pursuing ambitious plans for small satellite launch and industrial growth, and leads the UK's international collaboration on civil space programmes. Defence will actively support this work by providing capabilities, infrastructure and personnel, and will derive benefit from these activities for us and our partners. We will strengthen our partnerships across Government and support international initiatives to promote the responsible use of space. We will identify opportunities to support growth of the UK space sector and expansion of UK space exports. And we will work with the owners and operators of our space Critical National Infrastructure to enhance their resilience, including by developing coordinated plans to respond to threats and hazards.

Source: MOD Defence Space Strategy Headlines, <https://assets.publishing.service.gov.uk/>

III. Ответьте на вопросы:

1. Why did the Defence Secretary initiate the Modernising Defence Programme?
2. What responsibility has Air Command assumed?
3. What is the mission of the Modernising Defence Programme?
4. What are 3 main strategic objectives?
5. How will the Defence support the work of the UK Space agency?
6. What is the purpose of working with the owners and operators of the space Critical National Infrastructure?

IV. Переведите письменно. Значение неизвестных вам терминов выясните по словарю:

Локальные войны последних десятилетий наглядно продемонстрировали преимущество, предоставляемое космическими средствами на поле боя, независимо от того, ведутся ли боевые действия в пустыне, горных районах или крупных городах. Космические средства предоставляли вооруженным силам возможность применять ударные системы ВТО с высокой точностью и

при минимальных сопутствующих разрушениях. В связи с этим ведущие технически развитые государства, прежде всего США, рассматривают космические средства как важнейший элемент обеспечения боевых действий и применения современного оружия, в том числе и ВТО.

Активное использование космического пространства в военных целях может обеспечить:

- контроль использования другими странами космического пространства, а также суши, акваторий морей и океанов Земли;
- получение полной и достоверной информации о противнике в масштабе времени, близком к реальному, и оперативное доведение ее до всех органов управления и элементов войск (сил);
- развертывание сил и систем ВТО, способствующих достижению военных целей с минимальными потерями и минимальным ущербом для гражданского населения и окружающей среды;
- защиту национальной территории и развернутых группировок войск от оружия массового поражения и ударов средств воздушно-космического нападения, в первую очередь баллистических и крылатых ракет.

Для выполнения ряда мероприятий РХБЗ, а именно засечки ядерных взрывов, сбора данных о радиационной обстановке, оповещения своих сил о применении противником ядерного оружия, а также оперативного предоставления соответствующей информации органам военного и государственного управления применяются космические системы предупреждения о ракетном нападении (СПРН), разведки и связи. Размещение на КА датчиков, регистрирующих изменение радиационного фона, позволит расширить спектр средств, применяемых для засечки ядерных взрывов и тем самым повысить полноту и достоверность выявления радиационной обстановки.

Source: Использование космического пространства в военных-целях: современное состояние и перспективы развития систем информационно-космического обеспечения и средств вооружения, <https://cyberleninka.ru/>

V. Выступите в роли переводчика:

Информация о космической программе Великобритании, как правило, не слишком часто фигурирует в источниках СМИ. Какой же орган за нее отвечает?	The Great Britain Space Agency which replaced the British National Space Center in 2010 is responsible for space research
Какова основная цель исследований Космического агентства Великобритании?	The National Space Program is concentrated on research using radio telescopes, satellite telecommunications and participation in GPS and Galileo systems
Производились ли агентством запуски спутников?	The one and only satellite launch was executed in 1971 from the launch site in Australia, since when no manned missions have been considered or approved officially
Что это был за спутник и каково его предназначение?	The Prospero X-3 was designated for research connected with communication satellite development. It was the first and only satellite launched by Great Britain using the in-house designed launch vehicle Black Arrow. Before that British satellites used American launch vehicles

RAF STATIONS

RAF Akrotiri

RAF Akrotiri is home of the Cyprus Operations Support Unit which provides joint support to British Forces Cyprus and operations in the region to protect the UK's strategic interests.

RAF Akrotiri is an extremely busy Permanent Joint Operating Base that supports ongoing operations in the region as well as support for the Sovereign Base Areas on Cyprus. It is used as a forward mounting base for overseas operations in the Middle East and for fast jet training.

RAF Ascension

RAF Ascension Island is in the South Atlantic Ocean, near the equator, strategically positioned approximately 4,000 miles from both the UK and the Falkland Islands.

The role of the Station is to deter military aggression against the UK's South Atlantic Overseas Territories in order to maintain UK sovereignty.

It serves as a staging post for flights between the UK and the Falklands with an approximate flight time of 8 hours.

RAF Benson

RAF Benson in South Oxfordshire is a support helicopter main operating base working within the Joint Helicopter Command.

RAF Benson is home to two front-line Puma HC2 helicopter squadrons, and one Operational Conversion Unit, flying a mix of Puma HC2 and Chinook HC4 helicopters.

RAF Benson is also home to the civilian National Police Air Service and the Thames Valley Air Ambulance which operate 24 hours a day.

RAF Boulmer

RAF Boulmer in Northumberland is a critical component of the RAF Battlespace Management Force and home to the Air Surveillance and Control System (ASACS).

The Control and Reporting Centre (CRC) at RAF Boulmer uses ground-based military and civilian radars to monitor, detect and identify all aircraft in and around UK airspace - 24/7, 365 days a year. This is called the Recognised Air Picture (RAP). The Quick Reaction Alert Typhoons at RAF Lossiemouth and RAF Coningsby can be scrambled to intercept unidentified aircraft.

RAF Brize

RAF Brize Norton in Oxfordshire is the largest RAF Station with approximately 5,800 Service Personnel, 1,200 contractors and 300 civilian staff.

The Station is home to the RAF's Strategic and Tactical Air Transport (AT) and Air-to-Air Refuelling (AAR) forces, as well as host to many lodger and reserve units.

With its mixed fleet of aircraft, RAF Brize Norton provides rapid global mobility in support of UK overseas operations and exercises, as well as AAR support for fast jet aircraft both on operations and in support of UK Homeland Defence.

RAF College Cranwell

RAF College Cranwell is a thriving RAF Station in the heart of Lincolnshire with a long and distinguished history dating back to its foundations as a Royal Navy Training Establishment in 1916. It was the world's first Air Academy and today, it continues to select and train the next generation of officers and aircrew. It is also home to No 3 Flying Training School which delivers the elementary flying training for fixed wing and multiengine student pilots from the RAF, Royal Navy and Army Air Corps, No 6 Flying Training School which oversees all

University Air Squadrons in universities across the UK and the Tedder Leadership Academy.

RAF Coningsby

RAF Coningsby in Lincolnshire is one of two RAF Quick Reaction Alert (QRA) Stations which protect UK airspace (RAF Lossiemouth is the other).

RAF Coningsby is home to two frontline, combat-ready squadrons and is the training station for Typhoon pilots.

Almost 3,000 Service Personnel, Civil Servants, and contractors work at RAF Coningsby.

RAF Cosford

RAF Cosford in Shropshire is a major part of the Defence College of Technical Training (DCTT). It is at the centre of the RAF's mission to deliver flexible, affordable, modern and effective technical training that meets the needs of the UK's Armed Forces now and into the future.

RAF Apprenticeships delivered at RAF Cosford were recently recognised as 'Outstanding' by Ofsted.

RAF Cosford is also home to the popular RAF Museum and the world-renowned Cosford Airshow.

RAF Digby

The oldest RAF station, opened on 28 March 1918, is located near the village of Scopwick and is an important signals site for all three services. Home to the Joint Service Signals Organisation, part of the Intelligence Collection Group, the station is tri-service and is alternately commanded by a British Army Colonel or RAF Group Captain.

RAF Fylingdales

RAF Fylingdales in North Yorkshire provides a continuous ballistic missile early warning service to the UK and US Governments, ensuring a surprise missile attack cannot succeed.

As a key part of the Allied Space Surveillance Network, the Unit also monitors objects in space that can easily resemble incoming missiles when re-entering the atmosphere.

The Station also supports the United States' developing Missile Defense System.

Approximately 350 Service Personnel, Military Police, and civilian staff work at RAF Fylingdales.

RAF Gibraltar

RAF Gibraltar is located on the northern end of the Gibraltar peninsula, between the Spanish border and the Rock of Gibraltar.

The airfield's position at the western end of the Mediterranean makes it an ideal staging post for aircraft on operations and as a supporting base for major NATO exercises in the Mediterranean and Iberian peninsular areas.

RAF Halton

The primary role of RAF Halton is to train military and civilian personnel to perform to the highest standard for military operations.

RAF Halton has lodger units across a range of specialities from air activity to defence media operations.

RAF Halton is one of the largest RAF stations and home to approximately 2,100 personnel from all three armed services, foreign military, contractors, and civilians.

RAF Henlow

RAF Henlow in Bedfordshire provides the support to enable lodger units to deliver global operations.

RAF High Wycombe

RAF High Wycombe in Buckinghamshire is a major administrative support Station.

It hosts and supports HQ Air Command, several Groups, and the European Air Group. It also supports the Joint Ground Based Air Defence, and Joint Force Air Component Commander.

RAF High Wycombe acts as the liaison between the RAF and United States Visiting Forces (USVF), and human resource support for Ministry of Defence civil servants working on USVF Bases in the UK.

RAF Honington

RAF Honington in Suffolk is the home of RAF Force Protection who are responsible for protecting the RAF at home and abroad.

The Station hosts initial and further training for the RAF Regiment and specialist training for the RAF's entire Force Protection capability.

RAF Honington is home to three front-line RAF Regiment field squadrons and several operational and specialist units, including a specialist RAF Police Wing, and an RAF Regiment unit with responsibility for countering threats from chemical, biological and radiological hazards.

RAF Leeming

RAF Leeming in North Yorkshire trains, delivers, and supports UK and overseas Expeditionary Air Operations.

The Station is home to a diverse range of squadrons and lodger units including 90 Signals Unit, and a Mountain Rescue Team.

With such a broad range of expertise and close proximity to training areas at Spadeadam, Otterburn and Catterick, RAF Leeming is the preferred site for deployed exercises and detachments from UK and overseas units.

RAF Linton-on-Ouse

RAF Linton-on-Ouse is based in North Yorkshire. The Station's former role was to train fast jet pilots for the RAF and Royal Navy. The Station's current role is to support the Yorkshire Universities Air Squadron and draw-down RAF Operations in accordance with the closure plan.

RAF Lossiemouth

RAF Lossiemouth in Moray, north-east Scotland is one of two RAF Quick Reaction Alert (QRA) stations which protect UK airspace (RAF Coningsby being the other). It's the base for four Typhoon combat aircraft squadrons, one P-8A Poseidon Maritime Patrol Aircraft squadron, and a RAF Regiment squadron.

Aircraft and crews are maintained on high alert in order to scramble and intercept unidentified aircraft approaching UK airspace.

RAF Marham

RAF Marham is the home of the F-35 Lightning a 5th Generation, multi-role, stealth fighter.

The Station is also home to a range of engineering support functions from maintenance to frontline support. Over 3600 Service Personnel, civil servants and contractors work at RAF Marham.

RAF Mount Pleasant

The most recent purpose-built airfield in the RAF, Mount Pleasant was opened in 1985 to establish a fighter and transport presence in the Islands.

The RAF provides key elements of the forces that Headquarters British Forces South Atlantic Islands use to ensure the security of the Falklands, the South Sandwich Islands and South Georgia. Not only through the air bridge from RAF Brize Norton to Ascension Island and onwards to the Falkland Islands, but also through deterrence patrols across the immense area between the islands.

Currently based at Mount Pleasant are No 1435 Flight with 4 Typhoon FGR4, No 1312 Flight, with a single Voyager tanker and a Hercules C1 and No 1310 Flight operating the Chinook helicopter.

RAF Northolt

RAF Northolt in west London is used by both military and civilian aircraft and is home to units from all three Armed Services and the Ministry of Defence.

RAF Northolt plays an important royal role with both 32 (The Royal) Squadron and 63 Squadron RAF Regiment (Queen's Colour Squadron) based on the Station.

2,000 service personnel (from all 3 Armed Forces), civil servants, and contractors work at RAF Northolt.

RAF Odiham

RAF Odiham in Hampshire is a front line support helicopter base working within the Joint Helicopter Command.

The Station provides critical, rapid support for UK military operations throughout the world.

Home of the UK Chinook Force, RAF Odiham operates three Chinook squadrons.

RAF Scampton

RAF Scampton in Lincolnshire plays an important role in the protection of UK airspace as the home of No 1 Air Control Centre.

It is also home to the Mobile Meteorological Unit and to the world famous Royal Air Force Aerobatic Team (The Red Arrows).

600 personnel work at RAF Scampton, including Service personnel, contractors and civil servants.

RAF Shawbury

RAF Shawbury in Shropshire trains around 1,000 students a year from across the UK Armed Services and international partners to be robust, resilient military personnel, technically second to none.

The Defence Helicopter Flying School trains aircrew for the Royal Navy, British Army and the Royal Air Force. The Central Flying School (Helicopter) delivers the next generation of helicopter instructors.

RAF Spadeadam

RAF Spadeadam, located in Cumbria, is the only Electronic Warfare Tactics facility in Europe where aircrews can practise manoeuvres and tactics against a variety of threats and targets that they face in contemporary warfare.

The facility attracts aircraft from the RAF, Royal Navy, British Army and NATO Forces. The survival of aircrews over Iraq, Afghanistan or elsewhere, and the soldiers on the ground who depend on air support, are affected by the training provided by RAF Spadeadam.

RAF St Mawgan

RAF St Mawgan in Cornwall is a No 22 (Training) Group Station that provides a platform for future and current operations in the south west. The Station is home to the Defence Survive, Evade, Resist, Extract (SERE) Training Organisation (known as DSTO), and supports the Remote Radar Head at Portreath – part of the air defence system for the UK.

RAF Syerston

RAF Syerston is home to 2 Flying Training School (2 FTS) and houses both the headquarters and the RAF Central Gliding School, which provides formal training courses for members of the Volunteer Gliding Squadrons (VGS) located at various other locations around the UK.

RAF Syerston has three satellite airfields at Kenley, Kirknewton and RAF Little Rissington from which it operates the Viking T Mk 1 glider.

RAF Valley

RAF Valley on Anglesey is home to No 4 Flying Training School, responsible for training the UK's next generation of world-class fighter pilots.

Aircrew are also trained at RAF Valley for mountain and maritime operations throughout the world.

RAF Valley is also home to the Mountain Rescue Service, the military's only high readiness, all weather search and rescue, aircraft post-crash management asset.

RAF Waddington

RAF Waddington in Lincolnshire is one of the RAF's busiest Stations as the hub of UK Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) and the main operating base for airborne intelligence aircraft and systems like the E-3D Sentry AEW1.

Air ISTAR is the RAF's eyes and ears in the sky and provides British and NATO military commanders with critical information about activity on the ground, in the air, and at sea.

The Air Warfare Centre at RAF Waddington provides timely and contextual integrated mission support to front line commanders.

RAF Wittering

RAF Wittering located in Cambridgeshire and Northamptonshire, is the main operating base and headquarters for the RAF A4 Force and is a major Station for flying training.

The A4 Force deploys the vital engineering and logistic support needed to sustain RAF operations and exercises around the world, from explosive ordnance disposal to catering, and aircraft repair to ground transport vehicles.

No 16 Squadron is part of No 3 Flying Training School and provide elementary flying training to the next generation of RAF pilots.

The squadrons of No 6 Flying Training School, teach qualified pilots to become flying instructors, deliver elementary flying training to University Air Squadron students and give Air Cadets their first flying experiences.

Royal Air Force Woodvale

Royal Air Force Woodvale, near Formby in Merseyside, is currently home to flying units providing flying training to future University Air Squadron students and giving air experience flights to Air Cadet Organisations within the North West.

It is also home to 611 (West Lancashire) Squadron RAuxAF who meet there to conduct regular training.

RAF Wyton

RAF Wyton in Cambridgeshire is a Joint Force Command Station and home to the Joint Force Intelligence Group and the National Centre for Geospatial Intelligence, which provide intelligence support to the Armed Forces deployed on operations around the globe.

RAF(U) Swanwick

RAF(U) Swanwick in Hampshire is an Air Command Unit embedded within the London Area Control Centre run by National Air Traffic Services (NATS). Military and civilian Air Traffic Control staff work together to ensure the safe passage of civilian and military aircraft flying over England, Scotland and Wales (and their coastal waters).

The Distress and Diversion Cell at RAF(U) Swanwick is an emergency centre ready to assist aircraft in distress.

The Military Airspace Booking and Co-ordination Cell manage the segregation of large areas of airspace for unrestricted military training.

The Radar Analysis Cell work closely with the UK Airprox Board to provide radar data for investigations.

The Station is also home to the RAF Northolt radar controllers.

JHC FS Aldergrove

JHC FS Aldergrove is home to 38 Engineer Regiment of the British Army, and units of the Army Air Corps. The Station retains an RAF presence through an RAF Reserve Squadron and a University Air Squadron.

Leuchars Station

A British Army barracks in Scotland home to several RAF units. Leuchars Station passed from the RAF to the British Army in 2015 and is home to the Royal Scots Dragoon Guards, the Royal Engineers, Military police units, and also ESUAS and 612 (R) Squadron.

MOD Boscombe Down

MOD Boscombe Down is the tri-Service home of military aircraft Test & Evaluation and the Boscombe Down RAF Support Unit which provides administrative support to the military lodger units.

It is a civilian operated airfield, administered by the RAF Air Warfare Centre at RAF Waddington which supports aircraft development. It provides an operational airfield with the longest military runway in the UK.

MOD St Athan

MOD St Athan is a large Ministry of Defence site in the Vale of Glamorgan (southern Wales) and where the RAF's non-aircraft, ground engineering technicians are trained.

It is home to No 4 School of Technical Training who provide continued training to personnel from all three Services and MOD civilian staff. Their mission is to deliver flexible, affordable, modern and effective technical training that meets the requirements of the UK's Armed Forces.

St Athan is also home to the University of Wales Air Squadron.

AF MAP SYMBOLS

This section establishes a single standard for developing air symbols. It includes a variety of air related icons, modifiers, and amplifiers for building symbols. However, no attempt to depict all possible air symbols has been made. Rather, a standard method for constructing these symbols is presented. Once the user is familiar with the prescribed system, any desired unit can be depicted using the logical sequence provided in this chapter. The symbols shown in this chapter are adequate for depicting all air standard identities defined in STANAG 1241. When representing not yet defined units, select the most appropriate symbol combination contained herein. Avoid using any symbols, or combinations and modifications of symbols that differ from those laid down in this publication. If, after searching icons and modifiers given in this publication, it is necessary to create a new symbol, explain the symbol in an accompanying legend.

Composition of Air Symbols 0205. An air symbol is composed of a frame, colour (fill), icon, modifiers, and amplifiers (not shown) (Figure 1).

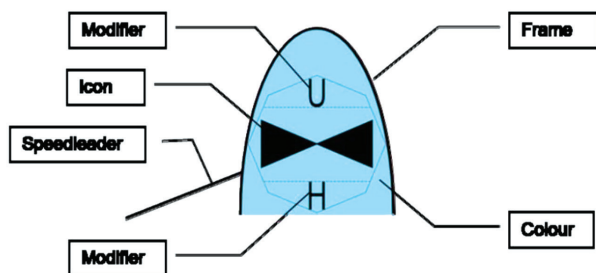





























Figure 1. air symbol composition

Table 2-1. Air Symbol Composition Process.							
Step No.	Step			Examples			
Step 1	Choose the frame according to standard identity.						
Air Standard Identities and Frame Shapes							
	Pending	Unknown	Assumed Friend	Friend	Neutral	Suspect	Hostile
Sea Sub-surface							
Step 2	Choose and add main sector icon.						
Step 3	Choose and add a modifier in either sector 1 or sector 2 if applicable or deemed necessary for visualization						
Step 4	Choose and add a second modifier if applicable and/or deemed necessary for visual representation. NOTE: only one modifier is permitted per modifier position						

ICONS

Icons in the main sector normally reflect the main function of the symbol, but in some cases can also reflect modifying information as well. Table 2-4 below shows the icons for use in air symbols in the main sector of the symbol.


Table 2-4. Air Main Sector Icons.			
FUNCTION	ICON	LOCATION	REMARKS
MILITARY	MIL		None
CIVILIAN	CIV		None
MILITARY FIXED WING			None
CIVILIAN FIXED WING			None
MILITARY RO- TARY WING			None

CIVILIAN RO-TARY WING			None
MILITARY BAL-LOON			None
CIVILIAN BAL-LOON			None
MILITARY AIR-SHIP			None

SECTION III – MODIFIERS

0212. Modifiers display additional information regarding the icon. Sector 1 modifiers are placed above the icon and denote aircraft type or mission area (see Table 2-5).

Table 2-5. Air Sector 1 Modifier Description.		
Modifier	Name	Description
A	Attack	Aircraft Type
B	Bomber	Aircraft Type
C	Cargo	Aircraft Type

F	Fighter	Aircraft Type
I	Interceptor	Aircraft Type
K	Tanker	Aircraft Type
U	Utility	Aircraft Type
V	VSTOL	Aircraft Type
PX	Passenger	Aircraft Type
UL	Ultra-Light	Aircraft Type
ACP	Airborne Command Post	Aircraft Type
ASUW	Antisurface Warfare	Aircraft Type
AEW	Airborne Early Wing	Aircraft Type
GOV	Government	Aircraft Type
	MEDEVAC	Mission Area
E	Escort	Mission Area
IC	Intensive Care	Mission Area
J	Jammer/Electronic Counter-Measures	Mission Area
P	Patrol	Mission Area
R	Reconnaissance	Mission Area
T	Trainer	Mission Area
PH	Photographic (Reconnaissance)	Mission Area
PR	Personnel Recovery	Mission Area
ASW	Antisubmarine Warfare	Mission Area
COM	Communications	Mission Area
ESM	Electronic Surveillance Measures	Mission Area
MCM	Mine Countermeasures	Mission Area
SAR	Search and Rescue	Mission Area
SOF	Special Operations Forces	Mission Area
SUW	Surface Warfare	Mission Area
VIP	VIP Transport	Mission Area
CSAR	Combat Search and Rescue	Mission Area
SEAD	Suppression of Enemy Air Defence	Mission Area

NATO GLOSSARY OF ABBREVIATIONS USED IN NATO DOCUMENTS AND PUBLICATIONS

A/A	air-to-air
A2C2	army airspace command and control
AA	anti-aircraft
AA	air armament
AA	air army
AAM	air-to-air missile
AB	airbase
ABCCC	airborne battlefield command and control centre
ABM	antiballistic missile
abn	airborne
AC	airspace control
AEROMEDEVAC	aeromedical evacuation
Air Ops	air operations
AIRREP	air activity report
ALO	air liaison officer
AMET	air medical (aeromedical) evacuation team
ASAT	anti-satellite
ASCM	antiship cruise missile
ASM	air-to-surface missile
ATC	air traffic control(ler)
avn	aviation

AWC	air warfare centre
BARCAP	barrier combat air patrol
BGUMA	battle group unmanned aircraft
BIFF	battlefield identification friend-or-foe
BMD	ballistic missile defence
BMEWS	Ballistic Missile Early Warning System
BVR	beyond visual range
CA	combat aircraft
CAPCU	combat air patrol control unit
CASO	chief air staff/support officer
CF	coalition forces
CID	combat identification
CM	cruise missile
CS	close support
DASC	direct air support centre
DCA	dual-capable aircraft
ECM	electronic countermeasures
EORSAT	electronic intelligence ocean reconnaissance satellite
FBS	fighter-bomber, strike
FS	fire support
HAS	hardened aircraft shelter
HEL, HELO, heli	helicopter
HLS	helicopter landing site
HUSLE	helicopter underslung load (equipment)
LR	long-range (Note: Aircraft)
MPA	maritime patrol aircraft
MR	medium-range (Note:MR aircraft)
MRCA	multi-role combat aircraft
MTH	medium transport helicopter
NEFMONATO	European Fighter Aircraft Development, Production and Logistic Management Organization

OSA	operational support aircraft
SAM	surface-to-air missile
SRT	short-range transport aircraft
TCA	trainer/cargo aircraft
TH	transport helicopter
UA	unmanned aircraft
UAS	unmanned aircraft system
ac,acft	aircraft
AAMP	Advanced Aircraft Maneuvering Program
AAPO	Advanced Aircraft Programs Office
AAIB	Aircraft Accident Investigation Board
AACE	Aircraft Alerting Communication EMP
AAMA	Aircraft And Missile Armament
ABD	Aircraft Battle Damage
CVW	Aircraft Carrier Air Wing
ACCB	Aircraft Configuration Control Board
ACMI	Aircraft Crew Maintainance Insurance
CVS	Antisubmarine Aircraft Carrier
AACV	Armored Aircraft Carrying Vehicle
BIACC	Basic Integrated Aircraft Command and Control
CAM	Chief, Aircraft Maintenance
FECA	Future European Combat Aircraft
CVG	Guided-Missile Aircraft Carrier
CVHG	Guided-Missile V/STOL Aircraft Carrier
HAFEZ	Hostile Aircraft Free Engagement Zone
LWA	Light Weight Aircraft
LWSR	Light- Weight Strike and Reconnaissance aircraft
LWSR(R)	Light- Weight Strike and Reconnaissance aircraft - Reconnaissance role
LWSR(S)	Light- Weight Strike and Reconnaissance aircraft - Strike role

LRAACA	Long-Range Air-ASW Capable Aircraft
MAG	Marine Aircraft Group
MAW	Marine Aircraft Wing
NMPA	NATO maritime patrol aircraft
NAMMA	NATO Multirole Combat Aircraft Development and Production Management Agency
NSDAB	Non-Self-Deployable Aircraft and Boats
VP	Patrol Aircraft
PAMS	Predictive Aircraft Maintenance System
PAA	Primary Aircraft Authorized
PAM	Procurement Aircraft and Missiles
SEMA	Special Equipment Mission Aircraft
SOA	Special Operations Aircraft
SART	Strategic Aircraft Recovery Team
WAAR	Wartime Aircraft Activity and Reporting

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