МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
УКРАЇНСЬКА ДЕРЖАВНА ЛЬОТНА АКАДЕМІЯ

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Навчальний посібник

English for Specific Purposes

Manual

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Навчальний посібник призначений для здобувачів вищої освіти освітнього ступеня «Бакалавр» другого року навчання спеціальності J6 «Авіаційний транспорт» за ОПП «Технічне обслуговування та ремонт повітряних суден та двигунів».
Розробка складається із 14 тематичних розділів з достатнім об'ємом професійно-направленого лексичного матеріалу із системами вправ та текстів для опрацювання, що супроводжуються завданнями до професійно-орієнтованих аудіо матеріалів; містить тематичні тести.

English for Specific Purposes: Manual for higher education applicants of Bachelor degree the second year studying based on academic program «Maintenance and Repair of Aeroplanes and Aircraft Engines» 2nd edition, revised and supplemented / Compilers: Piven V. V., Tymchenko S. V., Tsarova L.V. and other. – Kropyvnytskyi: USFA, 2025. – 135 p.
This manual is intended for higher education applicants of Bachelor degree the second year studying of specialty J6 – Aviation Transport based on academic program «Maintenance and Repair of Aeroplanes and Aircraft Engines». The manual contains 14 units with sufficient professionally oriented English vocabulary including listening tasks, followed by topical tests.

Розглянуто та рекомендовано до розгляду на Науково-методичній раді академії на засіданні кафедри професійної та авіаційної мовної підготовки, протокол від 25.05.2025 р., № 10 ,
розглянуто на НМРА, схвалено та рекомендовано до розгляду на Вченій раді академії протокол від 24.06.2025 № 6,
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Навчальний посібник «Англійська мова професійного спрямування» призначений для підготовки з професійної англійської (авіаційної) мови здобувачів вищої освіти освітнього ступеня «Бакалавр» другого року навчання за ОПП «Технічне обслуговування та ремонт повітряних суден та двигунів».

Розробка складається із 14 тематичних розділів з системами вправ та додаткових текстів для самостійного опрацювання, що супроводжуються словниками і дискусійними питаннями. Він містить достатній об'єм професійно-направленого лексичного матеріалу, який дозволяє формувати знання та навички майбутнього авіаційного інженера з професійної англійської мови, сприяє підвищенню індивідуального рівня розуміння текстової інформації, та володінню авіаційно-технічною англійською термінологією на практиці у разі виконування своїх професійних обов'язків з організації ефективного обслуговування авіаційної техніки.

У змісті послідовно розглянуті процедури з підготовки повітряного судна до вильоту, техогляд після завершення польоту, методи діагностування несправностей, основні види ремонтних робіт, буксировка та інше.

Даний навчальний посібник є результатом колективної праці викладачів кафедри професійної та авіаційної мовної підготовки. В укладанні тематичного матеріалу брали участь А. В. Сауленко, В. Л. Асріян, В. І. Азатьян, В. Б. Шевченко, Н. Г Гусаренко, С. В. Тимченко, Т. М. Бунь, К. Ю. Скиданова, Н. Д. Чала, Г. Г. Кириченко, Є. Б. Токар, І. В. Куліш, М. Є. Володарська. Над розробкою завдань з професійно-орієнтованого аудіювання працювали: к.п.н., доценти Тимченко С. В., Півень В. В., Царьова Л. В., ст. викладач Куліш І. В.

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AIRCRAFT MAINTENANCE REPAIR AND INSPECTION

U N I T 1

MAINTENANCE OF AN AIRCRAFT

Exercise 1.1 *Read and translate the text.*

To maintain an aircraft in a state of continuous airworthiness, the most advantageous policy foresees minor and major inspections at definite service periods. (1)Inspection means a visual examination to determine the conditions of an aircraft, engine, propeller, or of any other component or part. Checking means the determination of the operating conditions of any mechanisms of an aircraft by measurement or operation, or both. Checks may be performed: 1) on pilots' reports at stations where trips originate and maintenance personnel are based, such check is called ''Station Check''; 2) at the end of one or several trips, this check is called ''Routine Check''; 3) at terminals where equipment and personnel are available. Check which combines the three above checks together is called ''Base Check''. It is usually performed at certain periods and at places having special equipment or material necessary and where personnel are available. Overhaul means disassembly of an aircraft, engine, propeller, necessary for complete inspection, replacement repair, adjustment or refinish.

In inspecting the wings, fuselages, and similar structures, it is very important to watch for evidence of corroded or cracked skin, and injuries to protective coating. Cracked, bent or broken members of engine mounts are extremely dangerous and must be repaired or replaced before the aeroplane is again permitted to be flown. Care must be exercised in handling of all cowlings or fairings.

Items which require special attention in inspection and maintenance are movable surface security of attachment which must be checked periodically. Bolts or hinges, rollers or tracks must be secured and safe. These surfaces must be kept free from corrosion and

breaks, they must be checked for cracks, loose rivets, etc. It is necessary to change or correct grade of grease or lubricants according to the weather conditions

Cleanliness, order, and proper installation of equipment are important in the inspection and maintenance of an aeroplane. Loose objects such as tools, microphones, or flashlights must never be allowed on the floor of the cockpit. The metal frames holding the windshields and windows of enclosures must be kept free from corrosion and cracks.

Door locks must latch positively and lock or unlock easily. All moving parts must be oiled lightly at regular intervals. Seats must be inspected regularly for cracks or sharp projections. Their attachments and all fitting must be carefully fastened. Periodic inspection is required to keep all these parts in good operating condition. Safety belts must be given a regular weight test, they must be checked to see that webbing, straps, buckles, seams, etc. are in good condition.

Exercise 1. 2 *Answer the questions.*

1. What does the inspection mean?
2. What does the checking mean?
3. What is overhaul?
4. What is important in inspecting the wings and fuselages?
5. What must be done with cracked or broken members of engine mounts?
6. What items require special attention in inspection and maintenance?
7. What must be secured and made safe?
8. What is necessary to change according to the weather conditions?
9. What is important in the inspection and maintenance of an aeroplane?
10. What must never be allowed on the floor of the cockpit?
11. What must be oiled lightly at regular intervals?
12. What seats must the inspected for?
13. What must be given for safety belts?

Exercise 1.3 *Are the sentences true or false? Correct the false ones.*

1. Inspection means an unvisual examination to determine the conditions an aircraft, engine, propeller.
2. Checking means the determination of the operating conditions of any mechanisms of an aircraft by measurement or operation, or both.
3. Check may be performed on pilot's report at stations where trips originate and maintenance personnel are based.
4. Check may be performed at the end of one or several trips, this check is called "Station Check".
5. Check which combines "Station Check" and "Routine Check" is called "Base Check."
6. Overhaul means repair of an aircraft, engine, propeller.
7. In inspecting the wings, fuselage, and similar structures it is not so important to watch for evidence of corroded or cracked skin.
8. Cracked, bent or broken members of engine mounts are extremely dangerous and must be repaired.
9. Bolts or hinges, rollers or tracks mustn't be secured and made unsafe.
10. It is necessary to change or correct grade of grease of lubricant according to visibility.
11. Cleanliness, order, and proper installation of equipment are important in the inspection and maintenance of aeroplane.
12. Loose objects such as tools, microphones or flashlights are allowed on the floor of the cockpit.
13. The metal frames holding the windshields and windows of enclosures must be kept free from grease and oil.
14. Door locks must latch positively and lock or unlock easily.
15. Seats must be inspected regularly for corrosion.

Exercise 1.4 *Match English and Ukrainian equivalents.*

A	**B**
1. continuous airworthiness	a. особлива увага
2. to forsee minor and major inspection	b. погодні умови
3. to determine the condition of an aircraft	c. визначити стан літака
4. to be performed at certain periods	d. тривала придатність літака

5. disassembly of an engine	e. болти або шарніри повинні бути закріплені
6. protective coating	f. через регулярні інтервали
7. cowlings and fairings	g. гострі виступаючі частини
8. special attention	h. чистота, порядок та надійна установка
9. bolts or hinges must be secured	i. капоти та обтічники
10. weather condition	j. металеві рами
11. cleanliness, order and proper installation	k. демонтаж двигуна
12. on the floor of the cockpit	l. виконуватися у певний час
13. metal frame	m. на підлозі кабіни екіпажу
14. at regular intervals	n. передбачає значні та незначні огляди
15. sharp projection	o. захисний шар (обшивка)

Exercise 1.5 *Find in the text the synonyms for the following words and expressions.*

Foreknow, significant, define, implement, staff, some, dismantle, hazardous, to demand, neatness, windscreen.

Exercise 1.6 *In the list bellow find a definition for the given words.*

A	B
1. overhaul	. examine carefully, visit officially to see that rules or equipment are in order
2. personnel	. staff, persons employed in any work
3. crack	. ready or able to be used, obtainable
4. wind shield	. thorough examination for repairs
5. dangerous	. machine producing power or motion
6. maintenance	line of division where smth is broken, but not into separate parts
7. grease	. likely to be a danger or cause danger to
8. propeller	. shaft with blades for propelling a ship or an aircraft

9. available	any thick, semi-solid oily substance
10. engine	keeping equipment in repair
11. inspect	. window in front of the pilot's seat on an aircraft

Exercise 1.7 *Complete the sentences with the words from the text.*

1. Inspection means a _____ _____ to determine the condition of an aircraft.
2. Checking means the determination of the operating conditions of an aircraft by _____ or _____, or both.
3. Check may be performed at the end of one several trips, this check is called " _____ _____".
4. Base Check is usually performed at _____ periods and at places having special _____ or _____ necessary.
5. _____ means disassembly of an aircraft.
6. In inspecting the wings, fuselage and similar structures, it is very important to _____ for evidence of corroded or _____ skin.
7. Cracked, bent or broken members of _____ _____ are extremely dangerous.
8. Bolts on _____, rollers or _____ must be secured and made safe.
9. It is necessary to change or correct _____ of _____ of lubricants according to the _____ conditions.
10. Loose object such as tools, _____, or flashlights must never be _____ on the floor of the cockpit.
11. The _____ _____ holding the windshields and windows of enclosures must be kept free from _____ and cracks.
12. Door locks must _____ positively and lock or unlock _____.
13. Seats must be inspected regularly for _____ or sharp _____.
14. All moving parts must be _____ lightly at regular _____.
15. Safety belts must be given a regular _____ _____.

Exercise 1.8 *Put the words in correct order.*

1. Routine/ Check/ at/ the/ end/ one/ of/ several/ is/ performed/ or/ trips.

2. Base/ Check/ is/ called/ check/ combines/ which/ above/ the/ three/ checks/ together.
3. Means/ overhaul/ of/ an/ aircraft/ disassembly.
4. Engine/ mounts/ of/ are/ cracked/ extremely/ bent/ or/ broken/ dangerous/ members.
5. Rollers/ or/ tracks/ must/ be/ made/ safe/ and/ secured/ bolts/ on/ hinges.
6. In/ to/ change/ is/ necessary/ of/ lubricants/ to/ the/ conditions/ or/ correct/ grease/ of grade/ according.
7. Order/ and/ of/ are/ equipment/ cleanliness/ proper/ installation/ important/ in/ the/ of/ an/ inspection/ aeroplane.
8. Cockpit/ on/ the/ floor/ of/ the/ loose/ must/ objects/ never/ be/ allowed.
9. Must/ and/ lock/ door/ locks/ or/ unlock/ latch/ easily/ positively.
10. Weight/ safety/ test/ belts/ given/ must/ a regular/ be.

Exercise 1.9 *Retell the text.*

Topical test

1. The most advantageous police _____ minor and major inspections at definite service periods.

   a) finds b) foresees c) watches

2. Inspection means a visual examination _____ the conditions of an aircraft, engine, propeller.

   a) to see b) to check c) to determine

3. Check, which is performed at the end of one or several tips, is called "_____".

   a) Routine Check b) Station Check c) Base Check

4. Overhaul means _____ of an aircraft, engine, propeller.

   a) repair b) checking c) disassembly

5. In _____ the wings, fuselages, and similar structures, it is very important to watch for evidence of corroded or cracked skin.

   a) repairing b) checking c) inspecting

6. Cracked, bent or broken members of _____ mounts are extremely dangerous.

a) engine b) windshield c) fuselage

7. Items which require special attention in inspection and maintenance are movable _____.

a) bolts b) parts c) surfaces

8. Bolts or hinges, rollers or tracks must be secured and made _____.

a) unsafe b) safe c) reliable

9. Movable surfaces must be checked for _____, loose rivets, etc.

a) cracks b) breaks c) loose object

10. Cleanliness, order, and proper _____ of equipment are important in the inspection of an aeroplane.

a) use b) maintenance c) installation

11. Loose objects such as tools, microphones, etc. must never be _____ on the floor of the cockpit.

a) allowed b) prohibited c) found

12. The metal frames holding the windshields and windows of enclosures must be kept free from _____ and cracks.

a) breaks b) leakage c) corrosion

13. Door locks must _____ positively and lock or unlock easily.

a) close b) latch c) open

14. All moving parts must be _____ lightly at regular intervals.

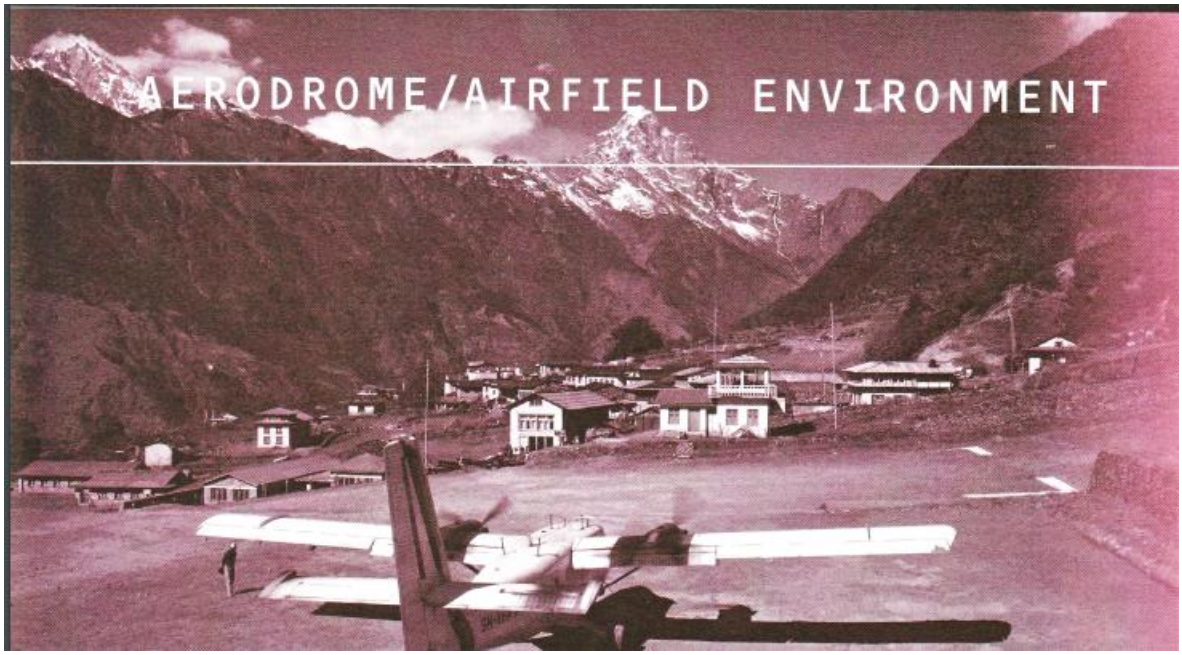
a) checked b) tightened c) oiled

15. Safety belts must be given a regular _____ test.

a) weight b) installation c) proper

Listening task

Describe Picture 1.



Picture 1.

1a Describe what you can see in Picture1. Use the words below.

mountains scattered vegetation sparse scrub

chalets and houses cumulus twin-engine marshaller valley overshoot

1b 3.19 Now listen to the sample answer and answer the questions.

1 Which region of the world is this airfield in?

2 What difficulties would a pilot face on landing and taking off?

3 What kind of condition is the runway in?

4 What do you think would happen if a pilot misjudged the approach?

5 Why are there no signs of activity?

Plain English - Listening for gist

2a 3.20 Listen to a description of a difficult approach.

Who do you think the speaker is?

a pilot b controller c plane spotter

Plain English - Listening for detail

2b 3.20 Listen again and fill in the spaces.

1 The runway at TGU is only_____ long.

2 There used to be a small hill some _____from the runway.

3 An airplane landing on runway 01 at TGU must circle inside the_____.

4 After it circles the basin it has only _____to line up.

5 The runway has a “displaced threshold’’ leaving only _____of useable landing runway.

Discussion

Discuss the questions with a partner.

1 Describe a difficult landing strip you know of.

2 What it is that makes landings and take-offs difficult?

3 What technology exists to help assist landings and take-offs?

4 What is your favourite landing strip? Why?

5 Do you think the number of small remote airstrips will increase or decrease in the future? Why?

U N I T 2

PREFLIGHT MAINTENANCE

Exercise 2.1 *Read and translate the text.*

The routine maintenance operations carried out on the aircraft provide for its reliable operation and readiness for flight; besides they guard the main joints, units and instruments against premature wear.

The routine maintenance operations include:

1. Preflight maintenance.
2. Maintenance at short-time parking.
3. Postflight maintenance performed every 25±5 flying hours.
4. Periodic maintenance performed every 100±10 and 500 $^{+}_{-}{}^{100}_{50}$ flying hours.

Aircraft preflight maintenance operations are performed just prior to flight with a view of checking the systems and separate units to determine their readiness for flight. Check the fuselage skin and engine nacelles for condition, see that blank covers and covers are removed from the engines and aircraft; inspect the pipelines of the fuel system in nacelles; check the quantity of fuel, oil, hydraulic fluid and water. Inspect the landing gear, its locks, doors and door locks. Test the engines and check operation of the electrical, radio and special equipment and serviceability of the systems.

Maintenance operations at short-time parking are performed with a view of preparing the aircraft for further flight. In this case, refuel the aircraft, inspect the propeller, the engine intakes and exhaust pipes. Clean the passenger cabin, wardrobe and baggage compartments. Inspect the fuselage skin, doors, hatches, landing lights and navigation lights.

During postflight maintenance operations which are performed every 25±5 flying hours inspect the power plant: the engines, propeller, and turbogenerator.

Install in place all the blank covers, clean the skin, landing gear, cabins, and toilet room. Inspect thoroughly the pipelines of the fuel, oil and hydraulic systems, the attachment fittings of the engines, and the turbogenerator, the condition of the fuel booster

pumps, attachment of the hydraulic and oil tanks. Examine the units of the fire-fighting equipment and check the filters of the systems.

Exercise 2.2 *Answer the questions.*

1 What does the routine maintenance operations include?

2 When are preflight operations performed?

3 What are preflight maintenance operations intended for?

4 What should be checked during preflight maintenance?

5 Is the engine tested when preflight maintenance is carried out?

6 What do maintenance operations at short-time parking serve for?

7 When is the aircraft refueled?

8 What units are inspected at short-time parking?

9 When are postflight maintenance operations performed?

10 What engine units are inspected during postflight maintenance operations?

11 Which system should be inspected thoroughly?

Exercise 2.3 *Are the sentences true or false? Correct the false ones.*

1 Aircraft preflight maintenance operations are performed just prior to flight.

2 See that blank covers are placed on the engine.

3 Quantity of fuel, oil, hydraulic fluid is not checked during preflight maintenance.

4 Serviceability of the electrical, radio equipment should be checked.

5 The purpose of maintenance operations at short time parking is to prepare the aircraft for further flight.

6 The landing gear is not inspected at short time parking.

7 The passenger cabin wardrobe and baggage compartments should be cleaned.

8 Postflight maintenance operations are performed every 354±5 flying hours.

9 Fuel, oil and hydraulic pipelines are thoroughly inspected.

10 The filters of the fire fighting systems aren’t examined.

11 The landing gear is inspected during postflight maintenance operations.

12 The blank covers should be installed in their places.

13 It isn't necessary to check condition of the fuel during postflight maintenance.

Exercise 2.4 *Match English and Ukrainian equivalents.*

A	B
1 prior to flight 2 servicing 3 at short-time parking 4 condition of the fuel booster pump to determine their readiness for flight 6 provide for 7 covers are removed 8 the fuselage skin 9 to install in place 10 turbo generator 11 to test the engine 12 to check the quantity of fuel 13 the routine maintenance operations blank covers and covers are removed 15 with a view of 16 engine intakes 17 serviceability 18 the pipelines of the fuel system 19 exhaust pipes 20 landing lights and navigation light	a. обшивка фюзеляжу b. заглушки та чохли прибрані (зняті) c. встановлювати на місце d. працездатність e. трубопроводи паливної системи f. перевіряти двигун g. поточні роботи з технічного обслуговування h. щоб визначити їхню готовність до польоту i. стан паливних підкачувальних насосів j. обслуговування k. вихлопні труби l. фари та навігаційні вогні m. перевіряти кількість палива n. турбогенератор o. до польоту p. чохли зняті q. передбачати r. на короткочасній стоянці s. з метою t. повітрозабірники двигуна

Exercise 2.5 *Find in the text the synonyms for the following words and expressions.*

Before; servicing;

find out; amount;

luggage; state;

to take away; wheels;
work; to carry out;
airscrew; connections;
passenger compartment; opening;
place; attentively;
reservoir; fire extinguishing system.

Exercise 2.6 *In the list bellow find a definition for the given words.*

A	**B**
1 check	a material for producing heat or energy
2 test	b lights on the tip of the wings and tail
3 fuel	c things needed for a particular purpose
4 intake	d aircraft headlamps used to illuminate the runway or taxiway during night operations
5 engine	e examine in order to learn whether something is correct
6 equipment	f passenger accommodation area of the aircraft
7 refuel	g place where water, air is taken into a pipe
8 landing lights	h a streamlined pod designed to house an aircraft engine
9 navigation lights	i to examine to find the quality value, operation
10 passenger cabin	j machine that converts energy into power or motion
11 engine nacelle	k to transfer additional fuel from the fuel truck to the aircraft

Exercise 2.7 *Complete the sentences with the words from the text.*

1 The routine maintenance operations _____ aircraft reliable operation.

2 Aircraft preflight maintenance are performed to _____ readiness for flight.

3 The pipelines of the fuel system should be _____.

4 Check _____ of the systems and equipment.

5 At short time parking the aircraft _____ for flight.

6 Maintenance operation at short time parking _____ refueling of the aircraft.

7 The passenger _____, wardrobe and baggage compartment must be _____.

8 The blank covers _____ in place during postflight maintenance operations.

9 The fuel, oil and hydraulic system pipelines are _____ thoroughly.

10 Examine the units of the _____ equipment.

Exercise 2.8 *Put the words in correct order.*

1 Install covers all the in blank the skin clean place and.

2 engines check and Test the system of the operation.

3 performed are maintenance flying every Postflight operations hours 25±5.

4 of the equipment Examine firefighting units the system.

5 to prior Aircraft operations are preflight just performed flight maintenance.

6 the condition skin engine and for fuselage nacelles Check condition.

7 of serviceability Test and the operation the engines the systems equipment check and of.

Exercise 2.9 *Retell the text.*

Topical test

1 The routine maintenance operations include postflight maintenance performed every _____ flying hours.

a) 25±5 b) 30±5 c) 35±5

2 Aircraft _____ maintenance operations are performed just prior to flight with a view to checking the systems and separate units.

a) postflight b) periodic c) preflight

3 Inspect the pipelines of the _____ system in nacelles.

a) fuel b) oil c) hydraulic

4 Maintenance operations at _____ parking are performed with a view of preparing the aircraft for further flight.

a) long-time b) periodic c) short-time

5 Test the engines and check the operation of the electrical, radio and special _____ and serviceability of the systems.

a) instuments b) equipment c) units

6 Inspect the fuselage skin, doors, hatches, _____ lights and navigation lights.

a) taxiing b) landing c) approach

7 During _____ maintenance operations which are performed every 25±5 flying hours inspect the power plant.

a) postflight b) preflight c) periodic

8 Examine the _____ of the fire-fighting equipment.

a) units b) joints c) instruments

9 Inspect the power plant: the _____, propeller and turbo generator.

a) cowls b) nacelles c) fuselage

10 Clean the passenger cabin, wardrobe and _____ compartments.

a) radio b) crew c) baggage

11 The routine maintenance operations carried out on the aircraft provide for its reliable operation and readiness for _____.

a) flight b) landing c) parking

12 The routine maintenance operations guard the main joints, units and instruments against _____ wear.

a) premature b) serious c) considerable

13 Check the fuselage skin and engine nacelles for condition, see that blank covers and covers are _____ the engines and aircraft.

a) placed b) removed from c) cleaned

14 Inspect the fuselage _____, doors, hatches, landing lights and navigation lights.

a) skin b) condition c) cleanliness

15 Inspect the _____, its lock, doors and door locks.

a) retracting mechanism b) wheel brakes c) the landing gear

Listening task

Describe Picture 2.

Picture 2.

1a Describe what you can see in Picture 2. Use the words below.

Foreground dispersal air-stair door APU palm baggage visibility carpet officials humidity fog background

1b 1.07 Now listen to the sample answer and answer the questions.

1 What kind of person is the flight for?

2 Why are there so many people by the aircraft?

3 Where are the people standing in relation to the aircraft?

4 How long after the landing do you think the photo was taken? Why?

5 What do you think will happen next?

Plain English - Listening for gist

2a 1.08 Listen to an interview about the effects of VIP flights on airports. Choose the best summary of the official's views.

a Closures due to VIP flights are inconvenient but necessary.

b VIP flights cause problems and should be directed to air force bases.

c VIP flights should be kept to a minimum.

Plain English - Listening for detail

2b 1.08 Listen again and name the problems that are mentioned.

cancelled flights controllers' stress heart attacks poor maintenance overheating congestion anxiety mid-air panic runway incursions swine fever

Discussion

1 Describe a VIP flight you know of.

2 What difficulties can VIP flights cause?

3 Should VIP flights be treated differently to other flights? Why? Why not?

4 Who should be classed as VIPs?

5 What type of aircraft will transport VIPs in the future?

U N I T 3

POSTFLIGHT INSPECTION

Exercise 3.1 *Read and translate the text.*

Postflight inspection must be made upon completion of every prolonged flight (every flight it excesses of three hours) or at the end of a flying day if the flights are of short duration must be made after the first flight.

Before inspection, while stopping the engine, listen for undue noise and check to see that time required for the engine rotor to come to rest from the 7.0% speed is not less than 55 sec.

1 To inspect the engine, proceed as follows:

2 Open the engine cowls and inspection lids.

3 Examine the inlet duct to make sure that the inlet guide vane assembly and compressor first-stage wheel are free of nicks.

4 Inspect the fuel, oil and air lines for damage and leaks. Check that the pipelines and accessories are properly attached.

5 Examine the front casing, compressor housing and combustion chamber casing.

6 Inspect the electrical wiring for proper condition and attachment.

7 Check the engine rotor for easy running by turning the propeller manually in the normal direction.

8 Check the engine attachment fittings and locking devices of all the accessories and lines.

9 Make sure that the engine control lever is securely linked to the fuel metering unit.

10 Check the oil level in the tank. If necessary, add oil.

11 Close the air inlet duct and the exhaust duct with special blanking covers.

Exercise 3.2 *Answer the questions.*

1 When must the postflight inspection be made?

2 What should you listen to and check before inspection?

3 What should you open to inspect the engine?

4 What do you have to inspect the fuel, oil and airlines for?

5 What casings should you examine?

6 What do you have to inspect the electrical wiring for?

7 In what way should you check the engine rotor?

8 What should be securely linked to the fuel metering unit?

9 In what case do you have to add oil in the tank?

10 What should be closed with special blanking covers?

Exercise 3.3 *Are the sentences true or false? Correct the false ones.*

1 Postflight inspection must be made after the flight.

2 Before inspection listen to undue noise.

3 To inspect the engine open the inspection lids.

4 Make sure that the inlet guide vane assembly is free of ice.

5 Inspect the fuel lines for damage and leaks.

6 Examine combustion chamber casing.

7 Inspect the attachment and proper condition of electrical wiring.

8 Check the engine rotor by turning the propeller.

9 Check engine locking devices of all the accessories and lines.

10 Close the air inlet duct and the exhaust duct with covers.

Exercise 3.4 *Match English and Ukrainian equivalents.*

A	**B**
1 engine cowl	a. кріплення
2 engine rotor	b. важіль керування двигуном
3 attachment fitting	c. газовідвідний канал
4 locking device	d. капот двигуна

5. inlet duct	e. стопорний пристрій

6. exhaust duct	f. повітропровід
7. engine control lever	g. паливний трубопровід
8. air-line	h. трубопровід
9. pipe-line	i. вхідний канал
10. fuel-line	j. ротор двигуна

Exercise 3.5 *Find in the text the synonyms for the following words and expressions.*

To test, reliably, spill, shell, unit, cap, needed, conductor, operation, connected, check, to see, by hand, engine throttle, channel.

Exercise 3.6 *In the list bellow find a definition for the given words.*

A	B
1. accessory	a. a small part on the outside of a piece of equipment to fix it to another one
2. lever	b. an object that covers a device to protect it
3. propeller	c. a handle that you pull or push to operate machinery
4. casing	d. an extra part added to an engine to make it more efficient
5. nick	e. a device with blades which is turned by the engine causing the aircraft to move
6. lid	f. a small cut made on the surface of something
7. fitting	g. a pipe, tube or, channel through which liquid or gas is sent
8. duct	h. the top which you open to reach inside a

	container

Exercise 3.7 *Complete the sentences with the words from the text.*

1 _____ inspection must be made upon completion of every prolonged flight.

2 Before inspection while stopping the engine, listen for _____ noise.

3 Examine the inlet duct to make sure that the inlet guide vane assembly is free of _____.

4 Check that pipelines are properly _____.

5 Inspect _____.for proper condition and attachment.

6 Cheek the engine by turning _____ manually in the normal direction.

7 Check the engine locking _____ of all the accessories.

8 Check the engine control lever is securely linked to the fuel _____.

9 Check the oil level in the _____.

10 Close the exhaust duct with special blanking _____.

Exercise 3.8 *Put the words in correct order.*

1 Open/ the/ engine/ to/ inspect/ cowls/ the.

2 Examine/ for/ duct/ the/ inlet/ nicks.

3 Inspect/ leaks/ for/ the/ fuel/ damage /line/ and.

4 Inspect/ attachment/ wiring/ the/ condition/ proper/ for/ electrical.

5 Propeller/ turning/ check/ manually/ the/ by/ rotor/ the/ engine/ directing/ for/ rotor/ running/ easy.

6 Lines/ locking/ fitting/ accessories/ of/ engine/ the/ attachment/ device/ all/ the/ and.

7 Tank/ oil/ check/ in/ the/ level/ the.

8 Duct/ cover/ with/ close/ the/ air/ inlet/ special/ blanking.

Exercise 3.9 *Retell the text.*

Topical test

1 Before inspection while stopping the engine, listen for _____ noise.

a) foreign b) undue c) loud

2 To inspect the engine open the engine _____.

a) cover b) casing c) cowl

3 Make sure that compressor _____ is free of nicks.

a) first stage b) flange c) front bearing

4 Inspect the fuel lines for _____.

a) condition b) damage c) devices

5 Inspect the electrical _____ for proper attachment.

a) cables b) lines c) wiring

6 Check the locking _____ of all accessories and lines.

a) devices b) instruments c) tools

7 Make sure that the engine control lever is securely linked to the fuel metering _____.

a) equipment b) unit c) device

8 Check the oil _____ in the tank.

a) amount b) type c) level

9 Close the _____ duct with special blanking cover.

a) outlet b) inlet c) inner

10 Check the engine rotor for easy _____.

a) turning b) vibrating c) running

11 Examine the combustion _____ casing.

a) device b) chamber c) unit

12 Inspect the air _____ duct for damage.

a) fuel b) inlet c) oil

13 Check to see that time required for the engine rotor to come to rest from 7.0% is not less that _____.

a) 55 sec b) 52 sec c) 50 sec

Listening task

Describe Picture 3.

Picture 3.

1a Describe what you can see in Picture 3. Use the words below.

collide scene of an accident fire service lodge underside trailing edge slice breathing equipment empennage floodlit forward chutes deploy

1b 3.04 Now listen to the sample answer and answer the questions.

1 Why do you think this incident happened?

2 How long after the collision do you think the picture was taken?

3 Where was the photographer in relation to the aircraft?

4 How long do you think it will take to rectify the situation?

5 What do you think will happen next?

Plain English - Listening for gist

2a 3.05 Listen to three tower controllers talking about ground collision incidents. Answer the questions.

1 How many incidents do they mention?

2 What part of the aircraft are they talking about?

Plain English - Listening for detail

2b 3.05 Listen again and decide if the statements are true or false.

1 An A340 and a B747 collided at Heathrow.

2 Passengers thought that the A340 was unsafe.

3 The BA was moving at the time of the collision.

4 An A380 collided with another aircraft in Thailand.

5 The Configuration Deviation List (CDL) applies to removal of equipment after collision.

6 In Seattle an MD80 struck a taxiing A340.

Discussion

Discuss the questions with a partner.

1 Describe a ground collision incident you know of.

2 What factors can affect the safe movement of aircraft on the ground?

3 Why is the aircraft manoeuvring area potentially hazardous?

4 Flow common are aircraft collisions in the aircraft manoeuvring area? Why?

5 What effect can an aircraft collision have on airport operations?

U N I T 4

FUEL SERVICING

Exercise 4.1 *Read and translate the text.*

Aircraft centralized fueling is accomplished by a servicing truck via the fueling panel arranged on the nacelle of the starboard engine. The tanks are filled with the aid of the automatic system, which controls the fueling valves in the process of fueling. The tank fueling signaling unit is arranged on the fueling panel. Prior to fueling, ground the aircraft with the aid of the grounding pin and the L.G. grounding conduits, ground the truck fueling pipe union, remove the blanks covers from the fuel tank vent intakes on the port side and starboard wings.

In case the aircraft is fueled or refueled through the upper filler necks of the fuel tanks arranged on the upper panels of the centre plane and the wing inner section use is made of a special ladder.

Fueling is performed as follows: service at first the second tank groups, the port side and starboard one bag rubber tanks, then service the first tank groups, the port side and starboard integral tanks. During fueling the aircraft is deenergized; the servicing truck is positioned so that exhaust gases of its running engine do not contact the aircraft parts. While fueling, use should be made of float level gauges which indicate the fuel level in the tank. If the integral tanks are filled partially the quantity of the fuel is controlled by the fuel flowmeter of the servicing truck with subsequent check by the dip stick.

During fueling see that no dust, moisture or snow gets inside the filler necks. To fuel the aircraft at night use should be made of explosion-proof extension lights or battery flash-lights.

Fuel may be drained from the aircraft either by gravity through the drain openings provided at the bottoms of the bag tanks, with the aid of a draining device or under a pressure, making use of the servicing truck or booster pumps of the fuel tanks, via the drain cocks arranged on the coarse fuel filters in the engine nacelles.

Exercise 4.2 *Answer the questions.*

1 How is aircraft centralized fueling accomplished?

2 Where is the tank fueling signaling unit arranged?

3 What shall you do prior to fueling?

4 Where are the upper filler necks of the fuel tanks arranged?

5 What tank groups shall be serviced at first?

6 How should servicing truck be positioned during fueling?

7 How can fuel level in the tank be checked?

8 What should you use while fueling aircraft at night?

9 How can fuel be drained from the aircraft?

10 Where are the drain cocks arranged?

Exercise 4.3 *Are the sentences true or false? Correct the false ones.*

1 The tanks are filled with the aid of the automatic system, which controls the float level gauge in the process of fueling.

2 During the fueling, ground the aircraft with the aid of the grounding pin and the L.G. grounding conduits.

3 In case the aircraft is fueled or refueled through the upper filler necks of the fuel tanks use is made of dip stick.

4 At first service bag rubber tanks, then service integral tanks.

5 During fueling the aircraft isn’t deenergized.

6 Float level gauges indicate the fuel level in the tank.

7 If the integral tanks are filled completely the quantity of the fuel is controlled by the fuel flowmeter of the servicing truck.

8 During fueling see that no dust, moisture or snow gets inside the filler necks.

9 The drain openings are provided at the bottom of the integral tanks.

10 Fuel may be drained from the aircraft under a pressure, making use of the servicing truck or booster pumps of the fuel tanks.

Exercise 4.4 *Match English and Ukrainian equivalents.*

A	B
1. fueling panel	a. паливний бак
2. grounding pin	b. зливний кран
3. grounding conduits	c. мірна лінійка
4. fuel tank	d. панель заправки
5. filler neck	e. поплавковий паливомір
6. servicing truck	f. штир заземлення
7. float level gauge	g. заправна машина
8. fuel flowmeter	h. м'який бак
9. dip stick	i. кабель заземлення
10. explosion proof extension light	j. фільтр грубої очистки
11. drain opening	k. вибухобезпечний переносний ліхтар
12. bag tank	l. паливний витратомір
13. drain cock	m. заправна горловина
14. coarse fuel filter	n. зливний отвір

Exercise 4.5 *Find in the text the synonyms for the following words and expressions***.**

Left side, place, realize, right engine, top panel, with the help of, before, following, amount, show.

Exercise 4.6 *In the list below find a definition for the given words***.**

A	B
1. valve	a. a streamlined housing for an engine
2. drain	b. a large container for storing fluid
3. nacelle	c. a mechanical device for controlling the flow of a fluid
4. gravity	d. gas which is the product of the combustion

	process and which is passed out through the exhaust system
5. booster pump	e. a device for measuring the flow of a liquid or gas
6. tank	f. to allow fluid to escape by providing a hole or tube, etc., through which it can pass
7. moisture	g. force of attraction which pulls bodies towards each other and which pulls objects on Earth towards its centre
8. fuel	h. a centrifugal pump often positioned at the lowest point of a liquid fuel tank to ensure positive pressure in the supply lines to the engine
9. exhaust gas	i. a substance such as gas, oil, petrol, etc., which is burnt to produce heat or power
10. flowmeter	j. water or other liquid

Exercise 4.7 *Complete the sentences with the words from the text.*

1. Aircraft centralized fueling is _____ by a servicing truck.
2. The tanks are filled with the aid of the _____ system.
3. The tank fueling signalling unit is _____ on the fueling panel.
4. Prior to fueling, ground the aircraft with the aid of the _____ _____.
5. In case the aircraft is fueled through the upper filler _____ of the fuel tanks use is made of a special ladder.
6. During _____ the aircraft is deenergized.
7. The servicing truck is positioned so that exhaust gases if its _____ engine do not contact the aircraft parts.
8. While fueling use should be made of _____ _____ _____ which indicate the fuel level in the tank.
9. To fuel the aircraft at night use should be made of _____ extension lights.
10. Fuel may be drained from the aircraft by gravity through the drain _____ _____ .

Exercise 4.8 *Put the words in correct order.*

1. accomplished / truck / Aircraft / by / fueling / a / is / servicing / centralized.
2. on / tank / panel / fueling / fueling / unit / is / The / arranged / the / signalling.
3. the / with / Ground / the / conduits / the / aircraft / grounding / and / the / L.G. / aid / grounding / of / pin.
4. the / wings / from / the / starboard / tank / fuel / intakes / on / Remove / the / port / vent / and / blanks / covers / side.
5. the / section / fuel / wing / upper / of / and / fuel / are / centre / necks / panels / arranged / the / on / upper / of / the / plane / the / tanks / The / inner.
6. the / groups / the / first / second / Service / port / one / side / tank / and / at / starboard.
7. the / If / of / integral / servicing / is / flowmeter / tanks / of / the / fuel / controlled / the / by / filled / the / partially / quantity / fuel / are / the / truck.
8. see / dust / to / that / no / gets / During / moisture / necks / snow / fueling / inside / the / it / or / filler.
9. tanks / of / drain / are / bag / provided / The / at / the / openings / the / bottoms.
10. nacelles / drain / the / arranged / are / on / The / in / coarse / the / cocks / fuel / engine / filters.

Exercise 4.9 *Retell the text.*

Topical test

1. Aircraft centralized fueling is accomplished by _____ .

a) draining device servicing truck grounding pin

2. Aircraft centralized fueling is accomplished via the _____ .

a) fueling panel control panel fire extinguishing panel

3. The fueling panel is arranged _____ .

a) on the starboard engine nacelle b) on the port engine nacelle

c) on the overhead panel

4. Automatic system controls _____ in the process of fueling.

a) the booster pumps b) the drain cocks c) the fueling valves

5. The tank fueling signaling unit is arranged _____ .

a) on the filler top b) on the fueling panel

c) on the coarse fuel filters.

6. Ground the aircraft with the help of _____ .

a) grounding pin b) grounding conduits

c) grounding pin and grounding conduits

7. Remove _____ from the fuel tank vent intakes on the port side and starboard wings.

a) the grounding conduits b) chocks c) the blank covers

8. _____ is positioned so that exhaust gases of its running engine do not contact the aircraft parts.

a) The aircraft b) The draining device c) The servicing truck

9. While fueling, use should be made of _____ which indicate the fuel level in the tank.

a) float level gauges b) vent intakes c) fueling valves

10. If the integral tanks are filled partially the quantity of the fuel is controlled by _____ .

a) float level gauge b) dip stick

c) the fuel flowmeter of the servicing truck and the dip stick

11. During fueling see that no dust, moisture or snow gets inside _____ .

a) drain cocks b) filler necks c) vent intakes

12. To fuel the aircraft at night use should be made of _____ .

a) battery flash lights b) explosion-proof extension lights

c) battery flash-lights or explosion-proof extension lights

13. Fuel may be drained from the aircraft by gravity through _____ .

a) drain openings b) drain cocks c) booster pumps

14. Drain openings are provided _____ .

a) on the starboard engine nacelle b) at the bottom of the integral tanks

c) at the bottom of the bag tanks

15. Fuel may be drained from the aircraft under a pressure, making use of _____ .

a) drain openings b) drain cocks c) booster pumps

Listening task

Describe Picture 4.

Picture 4.

1a Describe what you can see in Picture 4. Use the words below.

refueled clothing wing hillside underground vehicle underwing ground handler disconnect refueling pipe

1b 3.10 Now listen to the sample answer and answer the questions.

1 Where is the fuel stored?

2 What do you think the pilots are doing while the aircraft is being refueled?

3 Where are the fuel tanks on this aircraft?

4 Where do you think the picture was taken?

5 What do you think will happen next?

Plain English - Listening for gist

2a 3.11 Listen to a news bulletin about problems with new aircraft and answer the questions.

1 What is the problem?

2 What is the airline doing?

Plain English - Listening for detail

2b 3.11 Listen again and put the events in the correct order.

a The flagship was found to have fuel problems at Charles de Gaulle.

b Passengers were forced to wait 12 hours for a leak to be repaired.

c The flagship was delayed in Dallas.

d The airline issued a formal apology to the passengers.

e Two A380s were held at Boston.

Discussion

Discuss the questions with a partner.

1 What factors need to be considered when estimating the amount of fuel needed?

2 Describe a fuel-related incident you know of or have had.

3 What type of factors can cause fuel-related incidents?

4 How have aircraft become more fuel efficient?

5 What will aircraft use for fuel in the future?

U N I T 5

OIL SERVICING

Exercise 5.1 *Read and translate the text.*

The oil is delivered by an oil servicing truck to the oil tank of each engine through the tank filler necks. The filler necks must be provided with protective gauzes while dispensing guns and their filters must be clean.

Oil drain from the oil tank is performed via a drain plug of the feathering pump and through the valve arranged on the booster pump. From the oil cooler oil is drained via the valve on the engine front casing, the valve on the inlet tube of the booster pump, via the filter of the front casing and filter of the propeller governor. The drain valves should be opened only manually.

Exercise 5.2 *Answer the questions.*

1. What is the oil delivered by?
2. Where is the oil delivered to by an oil servicing truck?
3. What is the oil delivered through?
4. What must the filler necks be provided with?
5. What is oil drain from the oil tank performed via?
6. Where is the valve through which oil drain is performed arranged?
7. Where is oil drained from?
8. How should the drain valves ве opened?

Exercise 5.3 *Are the sentences true or false? Correct the false ones.*

1. The oil is delivered by an oil servicing truck
2. The oil is delivered to each engine nacelle.
3. It is delivered through tank filler valves.
4. The filler necks must be provided with protective gauzes.
5. Dispensing guns and their filters must be dry.

6. Oil drain is performed via drain valve.

7. From the oil cooler oil is drained via the valve on the engine nacelle.

8. The drain valves should be opened manually.

Exercise 5.4 *Match English and Ukrainian equivalents.*

A	B
1. oil servicing truck	a. роздавальний пістолет
2. filler neck	b. маслозаправник
3. deliver	c. зливний кран
4. dispense gun	d. насос, що підкачує
5. provide	e. заливна горловина
6. protective gauze	f. доставляти
7. perform	g. Флюгер-насос
8. drain plug	h. лобовий картер
9. feathering pump	i. забезпечувати
10. booster pump	j. виконувати
11. front casing	k. вручну
12. propeller governor	l. трубка
13. manually	m. захисна сітка
14. tube	n. регулятор повітряного гвинта

Exercise 5.5 *Find in the text the synonyms for the following words and expressions.*

Bring, via, defensive, grid, flap, dripple, coating, pipe, trap, by hand.

Exercise 5.6 *In the list bellow find a definition for the given words.*

A	B
1. oil	a. any machine designed to convert energy, esp heat energy, into mechanical work
2. tank	b. porous substance, such as paper or sand, that

	allows fluid to pass but retains suspended solid particles: used to clean fluids or collect solid particles
3. engine	c. any device for compressing, driving, raising, or reducing the pressure of a fluid, esp by means of a piston or set of rotating impellers
4. gauze	d. a protective case or cover
5. filter	e. any of a number of viscous liquids with a smooth sticky feel
6. pump	f. any device that shuts off, starts, regulates, or controls the flow of a fluid
7. valve	g. a passage, valve, or part through which a substance, esp fluid, enters a device or machine
8. casing	h. a large container or reservoir for the storage of liquids or gases
9. inlet	i. operated or done by hand
10. manually	j. transparent cloth of loose plain or leno weave

Exercise 5.7 *Complete the sentences with the words from the text.*

1. The oil is delivered by an oil _____ truck.
2. The oil is delivered through the oil tank of each _____.
3. The _____ necks must be provided with protective gauzes.
4. Dispensing guns and their _____ must be clean.
5. Oil drain is performed via a drain _____ of the feathering pump/
6. It is performed through the _____ arranged on the _____ pump.
7. From the oil _____ oil is drained via the valve on the engine front _____.
8. The _____ valves should be opened only _____.

Exercise 5.8 *Put the words in correct order.*

1. Servicing/ delivered/ truck/ oil/ is/ the/ by/ oil/ an
2. Filler/ the/ tank/ delivered/ necks/ the/ through/ oil/ is

3. Be/ protective/ necks/ provided/ gauzes/ filler/ must/ the/ with

4. Must/ clean/ dispensing/ filters/ and/ be/ guns/ their

5. Plug/ drain/ performed/ drain/ oil/ is/ via

6. Valve/ the/ arranged/ is/ pump/ booster/ the/ on

7. Is/ on/ the/ oil/ the/ valve/ casing/ front/ drained/ through/ engine

8. Be/ valves/ engine/ manually/ only/ the/ opened/ drain/ should

Exercise 5.9 *Retell the text.*

Topical test

1. The oil is delivered by _____.

a) a petroleum servicing truck

b) oil servicing truck c) gas servicing truck

2. It is delivered to the oil tank of each _____.

a) engine b) pump c) filter

3. Oil is delivered through _____.

a) the tank filler necks b) valves c) dispensing guns

4. The filler necks must be provided with _____.

a) protective plugs b) protective covers c) protective gauzes

5. The filters must be _____.

a) dry b) clean c) wet

6. Oil drain from the oil tank is performed via _____ of the featuring pump/

a) a drain plug b) filler neck c) protective gauzes

7. It is performed though the _____.

a) plug b) dispensing gun c) valve

8. The valve is arranged on the _____.

a) booster pump b) oil pump c) transfer pump

9. From the _____.oil is drained via the valve on the engine front casing.

a) drain plug b) oil cooler c) filler neck

10. There is a valve on _____ tube of the booster pump.

a) inlet b) outlet c) back

11. The drain valves should be opened only _____.

a) automatically b) electrically c) manually

U N I T 6

HYDRAULIC SYSTEM CHARGING

Exercise 6.1 *Read and translate the text.*

The aircraft hydraulic system is filled with hydraulic fluid. In case no fluid is present in the hydraulic system, the latter is filled as follows:

Place the aircraft on jacks, charge the hydraulic accumulators with nitrogen. Connect the hose from a ground hydraulic until to the pressure line of the main system whose pipe union is arranged on the starboard engine nacelle, and the fluid will flow to the hydraulic reservoir. With the system charged, the reservoir should accommodate 25 lit of fluid. Charging over, check the system, see that all its units are in proper condition.

In case no ground charging unit is available fill the hydraulic system via the filler neck of the hydraulic reservoir, located on the centre plane rear fillet, port side.

To drain the entire amount of fluid from the system, depressurize the hydraulic reservoir via the drain pipe union, discharge the hydraulic accumulators and connect a drain hose to the suction line pipe union. Thus the fluid is drained from the hydraulic reservoir except for the emergency fluid remainder which is drained via the drain cock of the hydraulic reservoir.

Exercise 6.2 *Answer the questions.*

1. What is the aircraft hydraulic system filled with?
2. How is the latter filled in case no fluid is present in the hydraulic system?
3. How many liters of fluid should the reservoir accommodate?
4. How should the hydraulic system be filled in case no ground charging unit is available?
5. Where is the filler neck located?
6. How would you drain the entire amount of fluid from the system?

Exercise 6.3 *Are the sentences true or false? Correct the false ones.*

1. The aircraft hydraulic system is filled with oil.

2. In case fluid is present in the hydraulic system, the latter is filled in a proper order?

3. Place the aircraft on jacks, charge the hydraulic accumulators with petrol.

4. Connect the hose from a ground hydraulic unit to the pressure line of the main system and the fluid will blow to the hydraulic reservoir.

5. The reservoir should accommodate 45 lit of fluid.

6. Charging over, check the system, see that all units are in proper condition.

7. In case ground hydraulic unit is available fill the hydraulic system via the filler neck of the hydraulic reservoir.

8. To charge the fluid into the system, depressurize the hydraulic reservoir.

9. To drain the entire amount of fluid from the system connect a drain hose to the suction line pipe union.

10. The emergency fluid remainder is drained via the drain cock of the hydraulic reservoir.

Exercise 6.4 *Match English and Ukrainian equivalents.*

A	**B**
1. hydraulic fluid	a. гідравлічні акумулятори
2. to charge with nitrogen	b. зливати рідину
3. pressure line	c. трубне з'єднання
4. pipe union	d. лінія нагнітання
5. ground hydraulic unit	e. гідравлічний резервуар
6. hydraulic accumulators	f. гідравлічна рідина
7. charge over	g. заправляти
8. hydraulic reservoir	h. наземний заправник гідравлічною рідиною
9. amount of fluid	i. кількість рідини
10. to drain the fluid	j. заправляти азотом

Exercise 6.5 *Find in the text the synonyms for the following words and expression.*

To test, to control, to charge, to set, to decompress, ingestion, back fillet, liquid, is located.

Exercise 6.6 *In the list below find a definition for the given words.*

A	B
1. hydraulic system	a. in the force that a quantity of gas or liquid has on a surface that it touches
2. inspection	b. examine in order to learn whether something is correct
3. pressure	c. sort of liquid which does not mix with water
4. jack	d. is a long, flexible pipe through which water or liquid is carried
5. hose	e. is a device for lifting a heavy object off the ground
6.check	f. system which is used for extension and retraction of flaps and larding gear
7. hydraulic fluid	g. checks performed at the end of one several flights

Exercise 6.7 *Complete the sentences with the words from the text.*

1. The aircraft _____ system is filled with hydraulic fluid.
2. In case no _____ is present in the hydraulic system, the latter is filled in a proper order.
3. Connect _____ from a ground hydraulic unit to the pressure line of the main system.
4. The fluid will flow to the _____.
5. The reservoir should _____ 251,7 of fluid.
6. Charging over, _____ the system, see that all its units are in proper condition.
7. In case no ground unit is available fill the hydraulic system via the _____ of the hydraulic reservoir.
8. Hydraulic reservoir is _____ on the centre plane rear billet.
9. To drain the entire amount of _____ from the system, _____ the hydraulic reservoir via drain pipe union.

10. Thus the fluid is drained from the _____ _____ except for emergency fluid remainder which is _____ via the _____ _____ of the hydraulic reservoir.

Exercise 6.8 *Put the words in correct order.*

1. The /fluid /aircraft /hydraulic /is /system /hydraulic /with /filled.
2. In /filled /present /is /in / after /the /system /the /hydraulic.
3. the /Connect / system /hose /main /from/ the /a /ground/ of/ hydraulic/ line/ unit/ pressure / the/ to/
4. fluid /The/ reservoir/ will/ hydraulic/ flow/ the/ to.
5. Charging /condition /over, /proper /check /in /the /are /system /units /see / its /all /that.
6. In /reservoir /case /hydraulic /no /the /ground /of /unit /neck /is/ filler /available /the /dill /via /system /hydraulic.
7. Hydraulic /fillet /reservoir / rear /is /plane /located /the /centre /on.
8. The /fluid /reservoir /of /25lit /should /accommodate/

Exercise 6.9 *Retell the text.*

Topical test

1. The aircraft hydraulic system is _____.with hydraulic fluid.

a) charged b) filled c) added

2. In case no _____ is present in the hydraulic system, the latter is filled in a proper order.

a) fluid b) oil c) leak

3. Place the aircraft on _____.

a) on three points b) the jack c) the ramp

4. _____.the hydraulic accumulators with nitrogen.

a) drain b) add c) charge

5. Connect the _____ from a ground hydraulic unit to the pressure line of the main system.

a) rod b) cable c) hose

6. The pipe union is _____.on the starboard engine nacelle.

a) arranged b) hinged c) attached

7. The fluid will flow to the _____.

a) tank b) hydraulic reservoir c) hydraulic system

8. The reservoir should accommodate _____ of fluid.

a) 20 lit b) 28 lit c) 25 lit

9. See that all units are in _____.condition.

a) proper b) good c) required

10. Fill the hydraulic system via the _____.of the hydraulic reservoir.

a) filler neck b) drain plug c) hydraulic accumulators

11. The hydraulic reservoir _____.on the centre plane rear fillet.

a) hinged b) arranged c) attached

12. _____.the entire amount of fluid from the system, depressurize the hydraulic reservoir.

a) to drain b) blow out c) to discharge

13. _____.the hydraulic reservoir via the drain pipe union.

a) discharge b) depressurize c) relief

14. Discharge the hydraulic _____.

a) accumulators b) batteries c) system

15. Connect a _____ to the suction line pipe union.

a) drain hose b) a truck c) a gage

U N I T 7

FLIGHT CONTROL SYSTEM MAINTENENCE

Exercise 7.1 *Read and translate the text.*

Lubrication of Bearings. The ball bearings used on control mechanisms are usually of the sealed type. Those marked with an ”X” contain grease of a grade which need not be changed in extremely cold weather. When bearings which are not marked are to be used in such weather, the grease will be washed out with gasoline or aircraft instrument oil and replaced with a very light grease. In all cases, care will be exercised to prevent washing the lubrication from the bearings while using cleaning solvents. Where the load is light or the movement relatively slow, plain bearings may be used. Fittings are provided for the lubrication of such bearings.

Linkage. The condition of control cables and other linkage requires special attention follow.

Because of the number of wires in control cables, their failure is never abrupt it is progressive over periods of extended wear. Many wires break shortly after the cables are placed in service. This breakage is due to the fact that some of the wires are under greater tension or are much harder than the rest. After these overstressed or overbrittle wires have broken, very few additional wires will break in normal service for a considerable time. Control cables are generally considered serviceable unless there are more than six broken wires in any 1-inch length of cable.

Any indication of rust should be investigated to determine the extent of internal damage to cables. Replacement of cables must be made when needed. To prevent corrosion of cables exposed to weather, especially cables exposed to salt water, cleaning is followed by the application of standard rust-preventive compound.

Push-pull rods must be free from corrosion, must not be permitted to bind, and must have attachments properly secured.

Special attention must be given to pulleys and fairleads and to that portion of the cable which passes through them. If the cable does not move freely through the pulley or fairlead, or if it shows wear at the points of contact with them, it must be replaced.

All bolts and other means of attachment must be properly secured with approved safety wire, cotter pins, or lock nuts.

Serious hazard may result if flight controls are jammed by such articles as microphones, flashlights, oxygen masks, etc., which may be dropped on the floor. All persons should be warned that each time one of the accessories carried in the airplane is used, it must be replaced and securely seated on the carrying hook or other receptacle provided. If an extra length of wire is used on the microphone, or tubing on the oxygen mask, the extra length should be neatly coiled and taped to convenient part of the airplane. This caution prevents such articles from making contact with any part of the airplane controls.

Exercise 7.2 *Answer the questions.*

1. Where are the ball bearings used on?
2. What should the grease be washed out with?
3. What are fittings provided for?
4. What items require special attention?
5. What are the facts which effect excessive cable wear?
6. When are control cables considered to be serviceable?
7. What should be done to prevent corrosion of cables?
8. What items must be free from corrosion?
9. What may happen if flight controls are jammed by some airplane articles?
10. What kind of items should be securely seated on the carrying hook?
11. Why is it so important to keep some aircraft articles from contacting with any part of airplane controls?

Exercise 7.3 *Are the sentences true or false? Correct the false ones.*

1. The condition of control cables and other linkage doesn't require special attention follow.
2. Where the load is light or the movement relatively slow, plain bearings may be used.
3. Control cables are generally considered serviceable unless there are more than six broken wires in any 1-inch length of cable.
4. Any indication of rust should not be investigated to determine the extent of internal damage to cables.
5. Special attention must not be given to pulleys and fairleads and to that portion of the cable which passes through them.
6. All bolts and other means of attachment must be properly secured with approved safety wire, cotter pins, or lock nuts.
7. All persons should not be warned that each time one of the accessories carried in the airplane is used.
8. Many wires break shortly after the cables placed in service.

Exercise 7.4 *Match English and Ukrainian equivalents.*

A	**B**
1. aircraft instrument oil	a. органічні розчинники
2. ball bearings	b. попереджати
3. lubrication	c. авіаційна (приладова) олія
4. grease	d. значний, поширений знос
5. to washed out	e. внутрішні ушкодження
6. fittings	f. надмірна довжина
7. frequent inspection	g. мастило
8. extended wear	h. кульковий підшипник
9. rust-preventive compound	i. консистентне мастило
10. cleaning solvents	j. заміна кабелю
11. at the points of contact	k. змивати

12. under greater tension	l. фітинги
13. internal damages	m. антикорозійний засіб
14. to warn	n. частий огляд
15. replacement of cable	o. у точках дотику
16. the extra length	p. з великим натягом

Exercise 7.5 *Find in the text the synonyms for the following words and expression.*

Used for; special care; fault; thought; be checked; change; substance; connection; articles; be aware; safely; danger; to alert; stuck; allowed; fragile; too long; to take into consideration; aircraft; smear/oil; sudden; strain.

Exercise 7.6 *In the list below find a definition for the given words.*

A	**B**
1. bearings	a. any thick oil substance, e.g. that used to help machines run smoothly
2. control cables	b. substance, esp. a liquid, that can dissolve another substance (free of dirt. etc)
3. rust	c. *adj*. that can be used: suitable for ordinary use or hard wear
4. lubricant	d. a device that allows part of a machine to turn smoothly
5. cleaning solvents	e. a set of wires for carrying electricity or electrical signals
6. grease	f. a substance that lubricates
7. serviceable	g. a reddish-brown substance that forms on iron or steel by the action of water and air
8. replacement	h. a mask placed over the nose and mouth through which a person can breathe oxygen, e.g. in an aircraft or a hospital
9. jammed	i. the action of linking or being linked. – a device,

	etc. that links two or more things
10. wire	j. a thing that can be dangerous or cause damage; a danger or risk
11. hazard	k. metal in the form of thin flexible thread, a piece of wire used to carry electric current or signals
12. linkage	l. the failure of a system or machine caused by smth. getting stuck or not makes movement of smth. difficult or impossible
13. airplane controls	m. the action of replacing smth. or being replaced
14. oxygen mask	n. the switches, buttons etc. by which a machine (or aircraft) is operated or regulated

Exercise 7.7 *Complete the sentences with the words from the text.*

1. The ball _____ used on control mechanisms are usually of the sealed type.
2. In all cases, care will be exercised to prevent washing the _____ from the bearings while using _____.
3. Serious _____ may result if flight controls are _____ by such articles as microphones, flashlights, _____.
4. Control _____ are generally considered _____ unless there are more than six broken _____ in any 1-inch length of cable.
5. Any indication of _____ should be investigated to determine the extent of _____ to cables.
6. Those marked with an “X” contain _____ of a grade which need not be changed in extremely cold weather.
7. _____ of cables must be made when needed.
8. This caution prevents such articles from making contact with any part of the _____.
9. The condition of control cables and other _____ requires special attention follow.
10. If the cable does not move freely through the pulley or fairlead, or if it shows wear _____ with them, it must be replaced.

11. To prevent corrosion of cables exposed to weather, especially cables exposed to salt water, cleaning is followed by the application of _____.

Exercise 7.8 *Put the words in correct order.*

1. condition/ attention/ linkage/ requires/ of/ control/ follow/ cables/ and/ other/ special/ the.
2. of/ such/ are/ provided/ for/ bearings/ the/ lubrication/ fittings.
3. when/ must/ of/ cables/ be/ made/ needed/ replacement.
4. from/ must/ be/ corrosion/ push-pull/ rods/ free.
5. may/ result/ if/ flight/ controls/ flashlights/ are/ jammed/ by/ serious/ such/ microphones/ articles/ as / oxygen/ masks/ hazard.

Exercise 7.9 *Retell the text.*

Topical test

1. The _____ bearings used on control mechanisms are usually of the sealed type.

a) roller b) ball c) plain bearing

2. When bearings which are not marked are to be used in such weather, the grease will be washed out with _____.

a) solvent b) gasoline c) rust-preventive compound

3. Many wires break shortly after the cables are _____ in service.

a) replaced b) disconcerted c) placed

4. Control cables are generally considered serviceable unless there are more than six broken wires in any _____ length of cable.

a) 2-inch b) 1-inch c) 5-inch

5. Any indication of rust should be investigated to determine the extent of internal _____ to cables.

a) defect b) failure c) damage

6. Special attention must be given to _____.

a) push-pull rods b) cables c) pulleys and fairleads

7. All _____ and other means of attachment must be properly secured with approved safety.

a) bolts b) screws c) hinges

8. Serious hazard may result if flight controls are _____ by such articles as microphones, flashlights, oxygen masks.

a) jammed b) damaged c) loaded

9. The accessories carried on the airplane must be placed on the carrying _____ or other receptacle provided.

a) devices b) hooks c) equipment

10. If an extra length of wire is used on the microphone, or tubing on the oxygen mask, the extra length should be neatly _____ and taped to convenient part of the airplane.

a) coiled b) packed c) cut

11. Those marked with an "X" contain _____ of a grade which need not be changed in extremely cold weather.

a) fluid c) grease c) oil

12. When bearings which are not marked are to be used in such weather, the grease will be _____ with gasoline or aircraft instrument oil and replaced with a very light grease.

a) added b) washed out c) cleaned

13. This caution prevents such articles from making contact with any part of the _____.

a) flight mechanisms b) airplane controls c) instruments

14. This breakage is due to the fact that some of the wires are under _____ or are much harder than the rest.

a) greater load b) greater stress c) greater tension

15. To prevent corrosion of cables exposed to weather, especially cables exposed to salt water, cleaning is followed by the application of _____ .

a) ordinary cleaning substance

b) standard rust-preventive compound c) petrol

U N I T 8

HYDRAULIC MAINTENANCE

Exercise 8.1 *Read and translate the text.*

The procedures discussed here have a wide range of application and are standard with almost every system. Specific points of system maintenance are usually detailed in the aircraft manufacturer's manual.

Adding Fluid. No hydraulic system can be expected to continue trouble-free operation unless the fluid is kept at the right level. Fluid level should be inspected every day or before each flight. Many reservoirs are provided with a sight gage so that the level can be determined at a glance. In others it is necessary to remove the filler cap and check with a sounding rod. Still others have a special sounding rod installed in the tank, having its own screw top. In either of the latter cases the tank must be opened to check the fluid level. Right here is the first important step in maintenance. Make certain that no dirt gets into the system.

If additional fluid is needed it should be added at once or a warning card should be placed in the cockpit so the plane will not be flown until after the fluid has been added. The following precautions should be observed when adding fluid:

1. Place the plane in a level three-point position before filling the reservoir.

2. Make sure that the fluid to be added is of the proper specification. This, too, is marked on the reservoir specification plate. If there is the slightest doubt as to the type required, find out for certain from some authority.

3. Go to extremes to see that no dirt, grit, water, or any other foreign matter enters the system. Clean the filler cap and adjacent area before removing the cap. Any funnels or other equipment used in the filling operation should be scrupulously clean.

4. If the fluid level is unduly low or if there are any other indications that fluid is being lost, then the reservoir (and if necessary the entire system) should be checked for leaks.

Cleaning. Routine cleaning of the system is limited to the reservoir and filters. Complete cleaning involves draining and flushing the system and is discussed later.

Reservoirs should be cleaned frequently. Cleaning intervals vary with operating conditions but a good rule is to drain the sump after every 25 hours of flight and to clean the screens after every 50 hours. Normal care should be taken when cleaning the screens does not enlarge the mesh or mar any seating surfaces. Never use a solvent when cleaning the screens unless it is an approved type of solvent for use in connection with the type of fluid being used. If no solvent has been specified it is best to use the regular hydraulic fluid for flushing and dry with compressed air.

If scraper-type filters are used the handle should be turned one complete revolution before each flight. Every 25 or 50 hours the filters should be drained and cleaned thoroughly. It is a good plan to relieve any system pressure before removing the filter drain plug. Although filters are usually installed so that there will be no system pressure on them, it is best to take no chances and to relieve the system pressure anyway before removing the drain plug.

Some systems are equipped with cartridge-type filters. These should be drained and cleaned periodically. In some cases, the cartridges cannot be cleaned but must be replaced with new fillers. In addition to the main filter, many systems employ line filters. These too should be cleaned periodically.

Exercise 8.2 *Answer the questions.*

1. How often should the fluid level be inspected?
2. How can the fluid level be determined?
3. What should be done in case if additional fluid is needed?
4. What precautions should be observed when adding fluid?
5. What is routine cleaning limited to?
6. What does complete cleaning involve?
7. How often the complete cleaning should be done?
8. What filter types is the hydraulic system equipped with?
9. When should the sump be drained?
10. When is regular hydraulic fluid used?
11. When should the system pressure be relieved?

Exercise 8.3 *Are the sentences true or false? Correct the false ones.*

1. Specific points of system maintenance are usually detailed in the Flight plan.
2. Fluid level should be inspected once a month.
3. Make certain that there is enough water in the system.
4. If additional fluid is needed it should be added at once.
5. If there is doubt as to the fluid type required inform the co-pilot.
6. Complete cleaning involves draining and flushing the system.
7. Always use a solvent when cleaning the screens.
8. Every 85-100 hours the fitters should be replaced.
9. If cartridge-type filters are used the handle should be turned one complete revolution before each flight.
10. It is a good plan to relieve any system pressure before removing the filter drain plug.

Exercise 8.4 *Match English and Ukrainian equivalents.*

A	**B**
1. system maintenance	a. вся система має бути перевірена на текти
2. fluid level	b. встановити літак на три точки
3. sight gage	c. планове очищення
4. at a glance	d. зменшити тиск у системі
5. to remove the filler cap	e.візуально
6. to check with a sounding rod	f. Ручка повинна бути повернена на один повний оборот
7. the precautions should be observed	g. перевірити за допомогою зонда
8. routine cleaning	h. повна очистка
9. complete cleaning	i. повинні бути замінені
10. if there is the slightest doubt	j. якщо не вказано розчинник
11. must be replaced	k. за виключенням
12. except for	
13. in addition to the main filters	

14. as thoroughly as possible 15. should be cleaned periodically 16. the entire system should be checked for leak 17. if no solvent has been specified 18. the handle should be turned one complete resolution 19. to relieve any system pressure 20. place the plane in a level three-point position	l. якомога ретельніше m. відкрити кришку заливної горловини n. якщо є хоч найменші сумніви. o. як доповнення до основних фільтрів p. рівень рідини q. технічне обслуговування системи r. візуальні вимірювальні прибори s. повинні періодично проходити очищення t. повинні дотримуватись заходів безпеки

Exercise 8.5 *Find in the text the synonyms for the following words and expression.*

Is charged; to put in a certain place; remove; is located; liquid; tank; time to time; every day cleaning; must be charged; often; required; employed; to examine; to place; servicing; make sure; flight deck; foreign objects facility.

Exercise 8.6 *In the list below find a definition for the given words.*

A	B
1. maintenance	a. sort of liquid which does not mix with water
2. inspection	b. careful visual examining
3. routine check	c. output of system process must defined technical standards
4. tank	d. checks performed at the end of one several flights
5. hydraulic system	e. system which is used for extension and retraction of flaps and landing gear

6. to check	f. examine in order to learn whether something is correct
7. procedure	g. is the system or process by which water or other liquid are drained from a place
8. pressure	h. there is a hole or crack in it which lets liquid or gas escape
9. solvent	i. is a substance that can flow, especially a liquid
10. a gauge	j. is the part of the plane where the pilot sits
11. a filter	k. is the flat, vertical surface of a television or computer or in the cinema on which pictures or worlds are shown
12. a rod	l. is a device through which smth is filtered
13. screen	m. is a device that shows the amount of smth
14. cockpit	n. is a liquid that can dissolve other substances
15. fluid	p. is the force that a quantity of gas or liquid has on a surface that it touches
16. leak	q. is a way of doing something especially the usual or correct way
17. drainage	r. is a long, thin, metal or wooden bar

Exercise 8.7 *Complete the sentences with the words from the text.*

1. Specific points of system maintenance are usually _____ in the aircraft manufacturer's manual.
2. Fluid level should be _____ every day.
3. Many _____ are provided with a sight gage so the level can be _____ at a glance.
4. Place the _____ in a level three-point position before filling _____ .
5. Make sure that the _____ to be added is of the proper _____ .
6. Go to extremes to see that any _____ matter enters the system.
7. Any _____ or other _____ used in the filling operation should be scrupulously cleaned.

8. If the fluid level is _____ then the reservoir should be checked for _____ .

9. Never use a _____ when cleaning the screens.

10. Every 25 or 50 hours the filters should be _____ and _____ thoroughly.

Exercise 8.8 *Put the words in correct order.*

1. each/ level/ be/ fluid/ should/ day/ before/ inspected/ flight/ every/ or/ each.

2. the/ glance/ at/ determined/ a/ be/ can/ level.

3. fluid/ the/ adding/ following/ when/ precautions/ be/ observed/ should.

4. no/ sure/ make/ foreign/ enters/ dirt/ the/ grit/ any/ or/ system/ other/ that/ water/ any/ matter.

5. use/ cleaning/ a/ screens /never /when/ the/ solvent.

6. some/ filters/ type/ system/ cartridge/ are/ with/ equipped.

7. in/ filters/ some/ new/ cases/ with/ the/ replaced/ cartridges/ be/ must/ cannot/ but/ cleaned/ be/ but/ new.

Exercise 8.9 *Retell the text.*

Topical test

1. Fluid level should be _____ every day or before each flight.

a) filled b) inspected c) added

2. The _____ must be opened to check the fluid level.

a) drain plug b) filler cap c) tank

3. Make sure that no _____ gets into the system.

a) snow b) dirt c) foreign objects

4. Place the plane in a level three-point position before _____ the reservoir.

a) cleaning b) draining c) filling

5. The proper specification of fluid is marked on the _____ .

a) cockpit panel b) reservoir specification plate c) filler cap

6. Routine cleaning of the system is _____ to the reservoir and filters.

a) required b) limited c) needed

7. _____ cleaning involves draining and flushing.

a) partial b) routine c) complete

8. Cleaning _____ vary with operating conditions.

a) intervals b) checks c) procedures

9. A good rule is to drain the sump after _____ hours of flight.

a) 30 b) 27 c) 25

10. Never use a solvent when it is an _____ type of solvent.

a) restricted b) required c) approved

11. The handle should be _____ one complete revolution before each flight.

a) placed b) turned c) fixed

12. System pressure should be _____ before removing the filter drain plug.

a) reduced b) relieved c) increased

13. Some systems are equipped with _____ filters.

a) fine b) coarse c) cartridge type

14. Many reservoirs are provided with a ____ab__ .

a) a silent rod b) a sight gage c) dip-stick

15. A _____ should be placed in the cock-pit.

a) note b) certificate c) warning card

U N I T 9

INSPECTING A HYDRAULIC SYSTEM
PREFLIGHT INSPECTION

Exercise 9.1 *Read and translate the texts.*

INSPECTING A HYDRAULIC SYSTEM

Very little can be done in the inspection of a hydraulic system other than routine checking for leaks, security of mountings, chafing, etc. particular attention should be paid to all hydraulic lines. Rigid lines should be inspected for indications of hardening due to vibration. Flexible lines should be inspected for deterioration and possible chafing. All piston rods should be cleaned and oiled in the fully extended position and inspected for pittings or indications of rust. Packing glands and the seals, of course, should be inspected for leaks. Specific points to be covered in the inspection are usually designated by the airplane manufacturer.

PREFLIGHT INSCPECTION

The condition and operation of a hydraulic system, insofar as possible, should be inspected every day or before the first flight of the day. The general procedure listed below should be followed:

1. Check the reservoir for the proper fluid level.

2. Check the accumulator preload. On most systems this can be done by building up full system pressure with hand pump. When the proper pressure is reached start reducing the system pressure slowly by operating some small units and watch the main system pressure gage carefully. The pressure indicated by this gage just before it suddenly drops to zero will be the accumulator preload. If it is not up to the specified standard the air pressure should be increased.

Note: Never charge the accumulator with air while there is fluid pressure in the system, as an incorrect air pressure charge will result.

3. Check the operation of the hand pump. This of course is unnecessary if the accumulator has been checked as described above.

4. Check the main engine pump by starting the engine and watching the main pressure gage.

5. Check the operation of the pressure regulator valve by setting the selector switches in neutral position and watching the main system pressure gage to determine at what pressures the regulator cuts in and cuts out.

6. Check the operation of the brakes by taxying.

7. Check the operation of all units that can be operated on the ground.

Note: If the plane is equipped with hydraulic windshield wipers a large sheet of paper should be placed under the wiper blades so the windshield will not be scratched.

Exercise 9.2 *Answer the questions.*

1. What lines should particular attention be paid to in the inspection of a hydraulic system?
2. What should rigid and flexible lines be inspected for?
3. What should be done with all piston rods?
4. Who designates specific points to inspect?
5. How often should the condition and operation of a hydraulic system be inspected?
6. Which units of a hydraulic system are checked during preflight inspection?
7. Where is fuel level checked?
8. What is the second point of inspection?
9. Is it necessary to check the operation of the hand pump if the accumulator has been checked?
10. In what way is the main engine pump checked by?
11. What should be placed under the wiper blades if the plane is equipped with hydraulic windshield wipers?

Exercise 9.3 *Are the sentences true or false? Correct the false ones.*

1. Particular attention in the inspection of a hydraulic system should be paid only to rigid lines.

2. All piston rods should be cleaned and oiled in the fully extended position.

3. Preflight inspection of a hydraulic system must be made before the last flight of the day.

4. The reservoir should be checked for the proper fluid level.

5. The accumulator should be charged with air while there is fluid pressure in the system.

6. It is not necessary to check the operation of the pressure regulator valve by setting the selector switches in neutral.

7. The operation of the brakes should be checked by setting the brakes.

8. It isn't allowed to check the operation of all units that can be operated on the ground.

9. The proper fluid level is checked in the reservoir.

10. The pressure indicated by this gage just before it suddenly drops to zero will be the accumulator preload.

11. The main engine pump is checked by watching the stand by pressure gage.

Exercise 9.4 *Match English and Ukrainian equivalents.*

A	**B**
1. the inspection of a hydraulic system	a. перед першим польотом дня
2. routine checking for leaks	b. робота редукційного клапана тиску
3. should be inspected for hardening	c. тиск повітря має бути збільшено
4. in the fully extended position	d. лобове скло не буде подряпане
5. for the proper fluid level	e. тиск у гідросистемі
6. the accumulator preload	f. прокладки та сальники
7. the air pressure should be increased	g. огляд гідравлічної системи
8. glands and seals	h. спостерігаючи за манометром основної системи
9. the operation of the pressure regulator valve	i. має оглядатися на затвердіння
10. watching the main system pressure gage	j. заряджання акумулятора
11. is equipped with hydraulic windshield wipers	k. на наявність відповідного рівня рідини

12. the windshield will not be scratched 13. before the first flight of the day 14. fluid pressure	l. поточна перевірка на наявність витоку m. у повністю опущеному положенні n. забезпечений гідравлічним склоочисником лобового скла

Exercise 9.5 *Find in the text the synonyms for the following words and expression.*

Examine; corrosion; scour; lubricate; to be embraced; mark; producer; prior to; liquid; appropriate; cautiously; begin; observe; fall; work; define; switch on; control; is fitted with.

Exercise 9.6 *In the list below find a definition for the given words.*

A	**B**
1. hydraulic system	a. to put oil onto part of a machine or part of smth that moves, to help it to move or work more smoothly
2. check	b. the force produced by the quantity of gas or liquid in a place or container
3. flight	c. a machine for forcing liquid or gas into or out of something
4. ground	d. a piece of rubber or plastic that keeps air, water, dirt etc. out of something
5. procedure	e. a continuous slight shaking movement
6. preflight inspection	f. an escape of gas or liquid through a hole in something
7. leak	g. an instrument for measuring the pressure or amount of something
8. vibration	h. the surface of the earth
9. oil	i. a set of units connected together and considered as a functioning whole; system which is used for extension and retraction of flaps and landing gear

10. reservoir	j. careful examining before the flight
11. pressure	k. examine in order to learn whether something is correct
12. gauge (gage)	l. a part of a machine or engine where a liquid is kept before it is used
13. charge	m. operation, trip or journey of an aircraft between two airports, operated by an airplane
14. pump	n. method of accomplishing a task
15. engine	o. if a battery charges, or if you charge it, it takes in and stores electricity
16. brakes	p. devices for cleaning rain and other precipitation from the windscreen
17. windshield wipers	q. a device that slows and stops motion, usually by friction
18. seal	r. motor, power unit or device used to convert chemical energy (fuel) into useful mechanical power

Exercise 9.7 *Complete the sentences with the words from the text.*

1. Particular attention should be _____ to all hydraulic lines.
2. All piston rods should be cleaned and oiled in the fully _____ position.
3. Specific points are usually _____ by the airplane manufacturer.
4. The condition and operation of a hydraulic system should be inspected _____ day.
5. The accumulator preload checking can be done by _____ up full system pressure with the _____ pump.
6. The checking of the hand pump operation is _____ if the accumulator has been checked.
7. The main engine pump is checked by _____ the engine and _____ the main system pressure gage.
8. One of the points of general procedure is to check the reservoir for the _____ fluid level.

9. The accumulator shouldn't be charged with air while there is _____ pressure in the system.

10. The operation of the pressure regulator _____ is checked by setting the selector _____ in neutral.

Exercise 9.8 *Put the words in correct order.*

1. be /all /attention /lines /particular /should /to/ hydraulic/ paid.
2. for /glands /the /be /leaks /packing /should/ seals /inspected /and.
3. fluid/ for/ reservoir/ check/ level/ the/ proper/ the.
4. while/ is/ the/ never/ accumulator/ air/ charge/ there/ with/ the/ pressure/ system/ in/ fluid.
5. starting/ the/ engine/ and/ the/ pressure/ check/ gage/ by/ watching/ main/ pump/ the/ engine/ main.
6. by/ the/ brakes/ operation/ taxying/ of/ check/ the.
7. should/ the/ blades/ a/ paper/ large/ be/ under/ wiper/ placed/ sheet/ of.

Exercise 9.9 *Retell the text.*

Topical test

1. _____ lines should be inspected be for deterioration and possible chafing.

a) rigid b) hydraulic c) flexible

2. The condition and operation of a hydraulic system should be inspected _____.

a) at the end of the day b) in the middle of the day c) every day

3. The accumulator must be charged with air while there is _____ in the system.

a) oil pressure b) fluid pressure c) air pressure

4. The operation of the brakes is checked by _____ .

a) taxying b) setting brakes c) releasing brakes

5. The operation of all units can be checked when the aircraft is _____ .

a) in the air b) on the ground c) on the runway

6. the operation of the pressure regulator valve is checked by watching _____ .

a) the fuel-pressure gage b) the oil-pressure gage

c) the main system pressure gage

7. All piston rods should be cleaned and oiled _____ .

a) in the fully-up position b) in the fully extended position

c) in the fully-deflected position

8. Check the reservoir for the proper _____ .

a) fuel level b) fluid level c) oil level

9. Particular attention should be paid to _____ .

a) all fuel lines b) air lines c) hydraulic lines

10. Packing glands and seals should be inspected for _____ .

a) deterioration b) leaks c) operation

11. On most systems the accumulator preload can be done by building up full system pressure with _____ .

a) the electric pump b) the manual pump c) the hydraulic pump

12. If the pressure is not up to the specified standard the air pressure should be _____ .

a) decreased b) maintained c) increased

13. Check the main engine pump by _____ the engine and watching the main pressure gage .

a) starting b) shutting-down c) warming up

14. A large sheet of paper should be placed under the wiper blades so the windshield will not _____ .

a) be scratched b) be cracked c) be broken

15. Specific points to be covered in the inspections are usually designated by ____.

a) the technical personnel b) the airplane manufacturer

c) the airplane operating instructions

Listening task

Describe Picture 5.

Picture 5.

1a Describe what you can see in Picture 5. Use the words in the box

departure	mountains	spray	fluid	melt	precipitation	snow
ice deposit	de-icing facilities			mountainous area		surface

1b ⊙2. 04 ***Now listen to the sample answer and answer the question***

1. Why is the aircraft being de-iced?
2. Where do you think the picture was taken?
3. What difficulties might the crew face when maneuvering? Why?
4. How long will the procedure take?
5. Where on the airfield is the activity taken?

Plain English – Listening for gist

2a ⊙2. 05 ***Listen to a type rating instructor talking about an icing event. Put the events in the correct order.***

a The pilot contacted ATC.

b The pilot stated he would fly until conditions improved.

c The aircraft rapidly began losing airspeed.

d Ice began building up on the wing.

e The pilot made an emergency descent.

Plain English – Listening for details

2b ⊙2. 05 ***Listen again and decide what these numbers mean.***

1	8-200	2	-8	3	1,200	4	125
5	1,200	6	4,000	7	11,000		

Radiotelephony - Listening

3a ⊙2. 06 ***Listen to the dialogue. Put the events in the correct order.***

a 28D gets control of the aircraft at 6,500 ft. _____

b 28D says they would like to continue the approach _____

c A Dornier, call sign 28D, makes an uncontrolled descent. _____

d The ATCO thinks the ice is causing problems for communication. _____

e The ATCO suggests 28D's airspeed instrument is malfunctioning. _____

f United 883 is issued approach clearance. _____

g The ATCO warns 28D about the possible icing conditions ahead. _____

h United 883 reports icing conditions to the ATCO _____

Radiotelephony – Plain English

3b Rearrange the words to make phrases from the dialogue

1 control / getting / I'm / just / some

_____

2 your / frozen / up / maybe / is / pilot / tube

_____

3 lost / we / all airspeed / with / warning / no

_____

4 might / pick / icing / some / you / more / up

_____

5 on / have / ice / you / might / antenna / your

Vocabulary Check

4a Match the words in the box with the definitions.

pick up (v)	build up (v)	boot (n)	freeze up (v)
melt (v)	vibrate (v)	accumulate (v)	heat (n)

1	To get more and more of something over a period of time	_____
2	To increase	_____
3	To collect a quantity of something	_____
4	The quality of being hot	_____
5	A tube bonded to a surface, e.g. wing edge. When pressurized with fluid, it breaks up ice.	_____
6	Becomes so cold that it does not work	_____
7	To change a solid substance in to a liquid	_____
8	To shake very quickly with small movements	_____

4b Complete the General Aviation Owner's Club guidance briefing on VIP visits with the words from 4a

GAOC *safety quidance*

Ice in flight is bad news. Ice (1) _____ on every exposed front surface of the airplane. It (2) _____ where no (3) _____can (4) _____ it, and where (5) _____ can't break it. This is not just the wings, propeller, and windshield, but also on the antennas, vents, intakes, and cowlings. It can cause pilot tubes to (6) _____, and antennas to (7) _____ so

severely that they break. In moderate to severe conditions, a light aircraft can (8) _____ so much ice that continued flight is impossible.

Discussion

5 Discuss the questions with a partner.

1 Is icing an issue where you work or fly? Why? Why on?

2 What meteorological condition lead to icing?

3 Why is ice acceleration lead to icing?

4 What equipment do aircraft have to manage icing?

5 What do pilots typically do if they experience severe icing in flight?

U N I T 10

LANDING GEAR MAINTENANCE

Exercise 10.1 *Read and translate the text.*

General Check. The inspection and maintenance of like parts of main landing gear, tail gear, and nose gear are essentially the same.

Periodically each airplane with retractable landing gear will be placed on jacks, and all mechanisms will be operated through complete cycles. Frequently, injury to the equipment will result if the retraction cycle is not followed through in the exact order in which it is given. Reversal in the middle of a cycle should never be attempted unless specifically authorized in Technical Orders. As the landing gear is retracted and extended, a careful check should be able to see that it operates freely throughout its total range and that each unit enters the well or bay provided for it with sufficient clearance.

If any shock cord is used, it must be inspected for breaks and frayed covering. It must be free from grease or oil, which would cause rapid deterioration of the rubber.

Locking devices must function perfectly. The landing-gear position indicators must show the gear position correctly, especially when extended or retracted. Warning devices must give a distinct signal if any landing gear unit is not down and locked when the throttle is moved to the retarded position. Cowling doors should operate freely and easily. Cables, if used, must have proper tension, be free from corrosion, and have only a limited number of broken wires. Braces and fittings should be free from bent or cracked parts and be securely attached. Missing bolts and parts with elongated bolt holes must be replaced.

Shock Strut. Since leaks may occur in air-oil shock struts, it is necessary to check the fluid level periodically and replenish the supply. All air pressure in the strut must be relieved before this operation can be performed.

Since improper deflation of a shock strut is very dangerous, great care must be exercised in deflation. The filler plug most commonly used is the straight-thread type with a small air duct leading from the base of the valve to the side of the plug near the top of the threads. The strut may be deflated by unscrewing the plug slowly until air escapes

through this duct and past the copper gasket. When this method is used, the core is usually injured to such an extent that replacement is required. When all sound of escaping air ceases, either type of plug may be removed safely.

The fluid level can be checked very readily when the airplane is in taxiing position and the strut is entirely deflated and collapsed. It is advisable to rock the airplane slightly after deflation to insure complete collapse of the strut. The fluid should be even with the bottom of the filler plug opening; if not, fluid of the type specified for the particular airplane should be added. When the fluid has been very low, air may be trapped in the strut as it is filled. This may be removed by inserting the plug loosely, and extending and collapsing the strut several times, preferable by the use of a jack or hoist. The fluid level will be lowered as the trapped air escapes to the top. The plug is again removed and fluid added. This process is repeated until the fluid level does not change, indicating that all air has been eliminated. The plug is then turned in on the copper gasket until it seals tightly.

After sufficient fluid has been put in the strut, the strut is inflated through the valve in the filler plug by means of a high pressure pump. Excessive tightening of the hose connections on the plug assembly may damage the valve. Wrenches or pliers will not be used to stop leakage which cannot be eliminated by hand tightening; instead, the fitting gasket should be replaced. The amount of inflation required is usually specified on the instruction plate attached to the strut, or it may be found in the handbook of instructions. The amount of extension of the strut is usually specified in inches.

After inflation, soapy water is used to make a careful check for leaks in the valve assembly. Leaks around the filler plug will be indicated by a seepage of fluid. A small seepage around the packing gland is desirable for lubrication of the piston. However, if there is an excessive seepage of fluid at the gland, or if air bubbles appear when soapy water is applied, the packing nut should be tightened firmly but not excessively.

Alcohol is the only fluid which may be used for cleaning or flushing struts containing hydraulic fluid. Any mineral oil compound or derivative will destroy the packing materials used in such struts and when carbon tetrachloride comes in contact with the fluid, it forms hydrochloric acid, a powerful corrosive agent. Many struts are now equipped with packing which is not injured by mineral oils, and are filled with petroleum-

base hydraulic fluid. This fluid is coloured red to distinguish it from the other fluid. Kerosene or naphtha may be used to clean and flush struts which employ petroleum-base fluid.

Exercise 10.2 *Answer the questions.*

1. What is the order of landing gear check?
2. What must shock cord be inspected for? What can grease or oil cause?
3. What are the functions of the landing-gear position indicators and warning devices?
4. What should you inspect cables for?
5. Why is it necessary to check the fluid level?
6. What is the most common type of the filler plug?
7. How may the strut be deflated?
8. When can the fluid level be checked?
9. How can the fluid level be changed?
10. What should be done after sufficient fluid has been put in the strut?
11. Where can the amount of inflation required be found?
12. How can the valve assembly be checked for leaks?
13. In what cases should the packing nut be tightened firmly but not excessively?
14. What may alcohol be used for?
15. What can mineral oil compound or derivative cause?
16. What other fluids may be used for cleaning and flushing struts?

Exercise 10.3 *Are the sentences true or false? Correct the false ones.*

1. The inspection and maintenance of like parts of main landing gear, tail gear, and nose gear are absolutely different.
2. Reversal in the middle of a cycle should never be attempted unless specifically authorized in Technical Manuals.
3. If any shock cord is used, it must be inspected for breaks and frayed covering.
4. Locking devices must not function perfectly.
5. Present bolts and parts with elongated bolt holes must be replaced.

6. Proper deflation of a shock strut is very dangerous.

7. The fluid should be even with the bottom of the filler plug opening.

8. The amount of extension of the strut is usually specified in millimeters.

9. Mineral water is used to make a careful check for leaks in the valve assembly.

10. Petroleum-base hydraulic fluid is coloured blue to distinguish it from the other fluid.

Exercise 10.4 *Match English and Ukrainian equivalents.*

A	**B**
1. inspection and maintenance	a. протерте покриття
2. the exact order	b. швидке знос
3. be inspected for	c. мінеральні олії
4. rapid deterioration	d. обмежена кількість
5. operate freely and easily	e. огляд та обслуговування
6. if used	f. коли використовується цей метод
7. a limited number of	g. точний порядок
8. the fluid level	h. гідравлічна рідина
9. air pressure	i. якщо використовується
10. when this method is used	j. змащення поршня
11. it is advisable	k. функціонувати вільно та легко
12. frayed covering	l. доцільно
13. instead of	m. перевіряться на наявність
14. lubrication of the piston	n. бульбашки повітря
15. however	o. рівень рідини
16. air bubbles	p. однак
17. hydraulic fluid	q. замість
18. mineral oils	r. тиск повітря

Exercise 10.5 *Find in the text the synonyms for the following words and expression.*

Examination; identical; aircraft; machinery; period; full, finished; accurate; category; fast; definite; essential; kind; verify; reasonable; liquid; firm; pincers; reference book; leakage; differentiate; wipe.

Exercise 10.6 *In the list below find a definition for the given words.*

A	**B**
1. landing gear	a. a unit of length in the U. S. Customary and British Imperial systems. equal to 1/12 of a foot (2.54 centimeters)
2. airplane	b. the structure (usually wheels) that supports an aircraft and allows it to move across the surface of the Earth when it is not flying
3. deflation	c. organic compound, a clear, oily, highly flammable liquid with a strong odour, distilled from petroleum (10-25 % of total volume)
4. strut	d. the act of deflating or the condition of being deflated
5. pliers	e. a colourless volatile flammable liquid, synthesized or obtained by fermentation of sugars and starches and widely used, either pure or denatured, as a solvent and in drugs, cleaning solutions, explosives, and intoxicating beverages
6. inch	f. a small instrument with two handles and two grasping jaws, usually long and roughened, working on a pivot; used for holding small objects and cutting, bending, and shaping wire
7. piston	g. a clear, colourless, fuming, poisonous, highly acidic aqueous solution of hydrogen chloride, used as a chemical intermediate and in petroleum production, ore reduction, food processing, pickling, and metal cleaning

8. alcohol	h. heavier-than-air vehicle, mechanically driven and fitted with fixed wings that support it in flight through the dynamic force of the air
9. hydrochloric acid	i. a solid cylinder or disk that fits snugly into a larger cylinder and moves under fluid pressure, as in a reciprocating engine, or displaces or compresses fluids, as in pumps and compressors
10. kerosene	j. a structural element used to brace or strengthen a framework by resisting longitudinal compression

Exercise 10.7 *Complete the sentences with the words from the text.*

1. Injury to the equipment will result if the _____ cycle is not followed through in the exact order in which it is given.
2. If any shock cord is used, it must be _____ for breaks and frayed covering.
3. Locking _____ must function perfectly.
4. Cowling doors should _____ freely and easily.
5. Missing bolts and parts with _____ bolt holes must be replaced.
6. When all sound of escaping _____ ceases, ether type of plug may be removed safely.
7. The fluid should be even with the _____ of the filler plug opening.
8. Wrenches or pliers will not be used to stop _____ which cannot be eliminated by hand tightening.
9. Leaks around the filler plug will be indicated by a _____ of fluid.
10. When _____ comes in contact with the fluid, it forms hydrochloric acid, a powerful corrosive agent.

Exercise 10.8 *Put the words in correct order.*

1. inspected / covering / for / it / breaks / be / and / frayed / must.
2. function / locking / perfectly / must / devices.
3. easily / should / and / cowling / operate / doors / freely.
4. of / improper / very / strut / dangerous / a / is / deflation / shock.

5. be / deflation / care / in / must / great / exercised.

6. should / fitting / replaced / the / be / gasket.

7. not / packing / be / the / should / firmly / tightened / but / nut / excessively.

Exercise 10.9 *Retell the text.*

Topical test

1. The inspection and maintenance of _____ parts of main landing gear, tail gear, and nose gear are essentially the same.
a) like b) different c) all
2. Reversal in the middle of a cycle should never be attempted unless specifically authorized in _____ .
a) Manuals b) Technical Orders c) handbooks
3. If any _____ is used, it must be inspected for breaks and frayed covering.
a) shock wire b) cable c) shock cord
4. Shock cord must be free from grease or oil, which would cause rapid _____ of the rudder.
a) deterioration b) hardening c) tension
5. _____ must show the gear position correctly.
a) The landing-gear indicators b) The shock absorber
c) The shock strut
6. _____ must give a distinct signal if any landing gear unit is not down and locked.
a) The landing gear indicator b) Warning devices
c) The shock strut
7. _____ must have proper tension, be free from corrosion and have only a limited number of broken wires.
a) Cables b) Valves c) Shock cord
8. Since leaks may occur in air-oil shock strut, it is necessary _____ the fluid level periodically and replenish the supply.
a) to measure b) to check c) replenish
9. All _____ in the strut must be relieved.
a) fluid pressure b) air pressure c) oil pressure
10. The fluid should be even with the _____ of the filler plug opening.
a) bottom b) top c) middle part
11. The plug is then turned in on the _____ gasket until it seals tightly.
a) metal b) tin c) copper
12. The amount of extension of the strut is usually specified in _____ .

a) inches b) millimeters c) feet

13. After inflation, _____ water is used to make a careful check for leaks in the valve assembly.

a) clean b) soapy c) mineral

14. _____ is the only fluid which may be used for cleaning or flushing struts containing hydraulic fluid.

a) Fuel b) Alcohol c) Petrol

15. When carbon tetrachloride comes in contact with the fluid, it forms, _____ a powerful corrosive agent.

a) hydrochloric acid b) nitric acid c) sulphuric acid

Listening task

Describe Picture 6.

Picture 6.

1a Describe what you can see in Picture 6. Use the words in the box

hangar	maintenance	cowling	intake	inspect	fan	engine
test	diagnostic	Jet aircraft	blade	turbine	cable	

1b ⊙2. 36 ***Now listen to the sample answer and answer the questions.***

1 What systems could the engineers be checking?
2 How long do you think the maintenance will take?
3 How do you think the engineer climbed inside the nacelle?
4 Why was the picture taken?
5 Where was the photographer taken from?

Plain English - Listening for gist

2a ⊙2. 37 ***Listen to four pilots who work for the same company. Decide what they are talking about.***

a Flying with inoperative equipment
b Complaints about inoperative equipment
c Which equipment is most often inoperative

Plain English – Listening for details

2b Listen again and decide if the statements are true or false. Write **T** ***or*** **F.**

1 One aircraft's APU has been inoperative for some time. _____
2 One of the pilots recently flew multiple legs without a functioning autopilot. _____
3 DB stopped flying due to mechanical reasons. _____
4 DB had been a military pilot. _____
5 DB didn't mind pilots complaining about inoperative equipment. _____
6 Once, a captain didn't accept an aircraft because of the refreshments on board. _____

Radiotelephony – Listening

3a ⊙2. 37 ***Listen to the dialogue between pilots and an aircraft traffic controller and <u>underline</u> the correct information.***

1 The pilot needs to do a *visual inspection* / *rectify the problem* / *wait for maintenance*.
2 RWY 34 becomes the active runway for *departing* / *arriving* / all *aircraft*.
3 The doors are *not touching the ground* / *are touching the ground* / *have broken off*.
4 The pilot needs to secure the doors / *remove the doors* / *disembark the PAX*.
5 The pilot *doesn't have* / *has* / *request specific equipment*.
6 An engineer *is not available* / *will arrive in a short time* / *will arrive after a long wait*.

Radiotelephony – Plain English

3b Rearrange the words to make phrases from the dialogue.

1 out / of service / disable / runway 26 / aircraft / due

_____

2 want / you / do / disembark / to / passenger / your

_____

3 get / main / the / lanfing gear / need to / we / pinned

_____

4 the field / there / is / maintenance / it? / on / that can / do

_____

5 for / we're / you / checking if / a mechanic / is / site / on

_____

Vocabulary Check

4a Match the words in the box with the definitions.

mechanic (n)	release (n)	inoperative (adj)	refuse (v)
sort out (v)	hangar (n)	install (v)	MEL (n)

1 Not working _____
2 The act of letting someone or something leave a place in order to do a job. _____
3 A document which provides for the operation of an aircraft in airworthy conditions. _____
4 Someone whose job is to repair machines. _____
5 To say that you do not want what someone has offered to you. _____
6 A large building where aircraft are kept. _____
7 To solve a problem successfully. _____
8 To put a piece of equipment in place. _____

4b Complete the B737-400 captain's report with the words from 4a.

CONFIDENTAL INCIDENT REPORTING

Arrived at aircraft which had just spent two days in the (1)_____. Dispatch (2) _____ paperwork indicated that there was an (3)_____ in the place for the secondary jump seat oxygen mask. The released indicated that the captain's oxygen mask was defective so it had been (4)_____ in the secondary jump seat position. The captain's position has been fitted with the serviceable mask from the secondary jump seat. However, the aircraft logbook indicated that the captain's oxygen mask was (5)_____ . In my opinion this is no-go item so I (6) _____ the aircraft. I asked a (7) _____ to come to the aircraft to (8)_____ the problem.

Discussion

5 Discuss the questions with a partner.

1 Describe the maintenance facilities at an airport you know.
2 Have you ever experienced a mechanical problem with an aircraft?
3 How common is unscheduled aircraft maintenance?
4 Hoe does unscheduled aircraft maintenance affect airlines?
5 How do aircraft breakdowns affect airport operation?

U N I T 11

WINGS MAINTENENCE

Exercise 11.1 *Read and translate the text.*

Skin and Protective Coating. In the inspection of wings, fuselages, and similar structures, it is very important to watch for evidence of corroded or cracked skin, and injuries to protective coating.

(1) Since corrosion is most likely to occur in pockets and corners on the inside where water or salt spray may accumulate, drain holes must always be kept open. Internal members may also be broken or distorted and weakened as the result of unusually violent maneuvers, extremely rough air, or hard landings. Buckled or displaced covering, loosened rivets, etc., may indicate internal failure. Parallel wrinkles may indicate warped frame members. In case such external conditions develop, the condition of the internal structure must be thoroughly investigated and repairs made if necessary.

(2) Small cracks leading away from rivets frequently occur in the metal covering^ 'They are usually caused by vibration. As a temporary means of arresting the development of such cracks, small holes are drilled at the extremities or just beyond. Permanent repair is made by patching. Since the aluminum-alloy sheet used for covering is very springy and hard to bend, it is likely to crack if one tries to straighten sections that are bent or dented.

(3) Aluminum-alloy surfaces from which the protective coating has been chipped, scratched, or worn, thus exposing the metal, should be recoated at once, since corrosion develops very rapidly.

Engine Mounts. Cracked, bent, or broken members of engine mounts are extremely dangerous and, without exception, must be repaired or replaced by the personnel authorized to do such work, before the airplane is again permitted to be flown. Cracks are most likely to occur at welded joints and, if small, may be very difficult to discern through the protective coating. This is especially true if the structure is not kept thoroughly clean. Special care must be exercised in inspecting for such cracks. If not properly tightened, mounting clamps and bolts will allow movement of the mount, with consequent rapid wear of the bolts, elongation of bolt holes, and serious vibration. When damaged, protective coatings should be retouched promptly to prevent the rusting of exposed steel surfaces.

Security. The security of attachment of movable surfaces must be checked periodically. Such parts loosen more readily than those which are stationary. Bolts on hinges, as well as those on the rollers and tracks, must be secured. All such units also have full, free movement to perform the service required.

Condition of Surfaces. The frames of these surfaces must be kept free from corrosion, breaks, and warping. Metal surfaces must be checked for cracks, loose rivets, etc.

Lubrication. Hinges, rollers, etc., are lubricated as necessary according to the lubrication chart. Sealed bearings frequently used on hinges are packed with grease at the time of assembly, and under normal conditions this is sufficient for the life of the bearing. Washing with any grease solvent removes the lubricant and makes it necessary to repack with the correct grade of grease. If the bearing lubricant becomes excessively hard in extremely cold weather, it may be flushed out with gasoline or aircraft instrument oil, and filled with a special grease which must be replaced with the usual grade when conditions become normal.

Setting of Tabs. Ground-adjustable trim tabs should be bent to the desired setting by the use of clamps and wooden blocks so that the entire surface will be adjusted evenly. In case the balance tab is adjustable, the rod is so adjusted that the tab will function also as a trim tab.

Rigging of Flaps. Plain flaps must be rigged so that they are normally in the neutral position. Split flaps must be fully closed when not in use. Fowler flaps must roll forward so that they close completely and become a continuous part of the under surface of the wing. In taxying, flaps should be fully retracted to protect them from stones or other objects.

Exercise 11.2 *Answer the questions.*

1. Why is it important to watch wings, fuselages and similar structures in the inspection?
2. Where is corrosion most likely to occur?
3. Why must drain holes be always kept open?
4. What may the reason for breaking and weakening of internal members be?
5. What may parallel wrinkles indicate?
6. What is it necessary to do if parallel wrinkles appear?
7. What may small cracks leading away from rivets cause?
8. What should be done with aluminum-alloy surfaces from which the protective coating has been chipped?
9. What must be done with cracked, bent or broken members of engine mounts?
10. Why is it necessary to check the security of movable surfaces attachment?
11. What chart should hinges, rollers etc. be lubricated according to?
12. What may be done if the bearing lubricant becomes excessively hard in cold weather?
13. What devices are used to adjust trim tabs?
14. In what position should flaps be whole taxying? Why?

Exercise 11.3 *Are the sentences true or false? Correct the false ones.*

1. Corrosion is most likely to occur in pockets and corners on the inside of structures.
2. Sealed bearings frequently used on hinges are packed with grease before the time of assembly.

3. Cracked, bent or broken members of engine mounts are not very dangerous and should be repaired during two months' period.
4. Plain flaps must be rigged so that the yare normally in the neutral position.
5. A temporary repair is made by patching.
6. The frames of the surfaces must be kept free from corrosion, breaks and warping.
7. If not properly tightened mounting clamps and bolts will allow movement of the mount with consequent rapid wear of the bolts.
8. The bearing lubricant becomes excessively hard in extremely hot weather.
9. Split flaps must be fully closed when not in use.
10. Bolts on hinges not on rollers and tracks must be secured.
11. The aluminum-alloy sheet used for covering is very springy and hard to bent so (that) it can not crack.

Exercise 11.4 *Match English and Ukrainian equivalents.*

A	**B**
1. engine mount	a. затискачі та дерев'яні колодки
2. internal members	b. зварювальні з'єднання
3. bucked or displaced covering	c. протягом монтажу
4. may indicate warped frame members	d. тріснуті, вигнуті або поламані елементи
5. small holes are drilled	e. закрилки Фаулера
6. aluminum-alloy surfaces	f. кріплення двигуна
7. cracked, bent or broken members	g. вигнутий або зміщений шар, що покриває
8. before the airplane is again permitted to be flown	h. висвердлюються маленькі отвори
9. welded joints	i. огляд на наявність таких тріщин
10. inspecting for such cracks	j. надійність кріплення рухомих поверхонь
11. rapid wear of the bolts	k. внутрішні елементи
12. the security of attachment of movable surfaces	l. поверхні з алюмінієвого сплаву
13. at the time of assembly	m. можуть свідчити про пошкоджені елементи каркасу
14. it may be flushed out with gasoline or aircraft instrument oil	n. тримери, що регулюються на землі
15. ground-adjustable trim-tabs	o. швидке зношування болтів
16. clamps and wooden blocks	p. він може промиватись сильним натиском бензину або приладовим маслом
17. split flaps	q. перш, ніж літаку знову дозволять літати
18. Fowler flaps	

	г.щілинні закрилки

Exercise 11.5 *Find in the text the synonyms for the following words and expression.*
Examine; rust; scour [skauE]; to oil; prior to; appropriate; mend; observe; begin; to appear; heavy (rough); to operate; to control; edge; to bore; installation; to spray; extremely; petrol.

Exercise 11.6 *In the list below find a definition for the given words.*

A	**B**
1. check	a. state of not being adequate; non-performance of what is normal, expected or required
2. vibration	b. small piece of material put on over a hole or a damaged or worn place
3. seal	c. to examine in order to learn whether something is correct
4. dent	d. a piece of rubber or plastic that keeps air, water, dirt etc. out of smth
5. clamp	e. line of division where smth is broken, but not in separate parts
6. attachment	f. joint on which a lid door or gate turns or swings
7. patch	g. act of joining
8. hinge	h. a continuous slight shaking movement
9. frame	i. hollow, depression, in a hard surface made by a blow or by a pressure
9. grease	j. make (a boat, ship, aircraft evenly balanced by arranging the position of the cargo, passengers etc; set sails to suit the wind
11. flap	k. equipment put together for a special purpose
12. corrosion	l. skeleton or main structure
13. failure	m. part of the wing of an aircraft that can be lifted in flight to alter its upward direction and speed
14. crack	n. any thick, semi-solid oily substance, used to lubricate axles
15. trim	p. corroding or being destroyed slowly by chemical action or disease
16. rig	q. band of iron, etc for strengthening or tightening

Exercise 11.7 *Complete the sentences with the words from the text.*

1. In the inspection of wings, fuselages, and similar structures, it is important _____ for evidence of corroded or cracked skin.
2. _____, flaps should be fully retracted to protect them from stones or other objects.
3. _____ may indicate internal failure.
4. When damaged, protective coating should be retouched promptly to prevent _____.
5. Cracked, bent or broken members of engine are extremely dangerous and must be repaired by _____ .
6. Corrosion is most likely to occur _____ on the inside where water or salt spray may accumulate.
7. The security of attachment of movable surfaces must be checked _____ .
8. If the bearing lubricant becomes excessively hard in extremely cold weather, it may be flushed out with _____ .
9. Parallel wrinkles may indicate _____ .
10. In case the balance tab is adjustable, the rod is so adjusted that the tab will function also as a _____ .
11. Small cracks leading away from rivets are usually caused by _____ .
12. _____ must be kept free from corrosion, breaks and warping.
13. Permanent repair is made by _____ .
14. _____ are lubricated according to the lubrication chart.

Exercise 11.8 *Put the words in correct order.*

1. not / split / be / fully / use / flap / must / closed / in / when.
2. by / permanent / patching / made / repair / is.
3. warped / may / frame / parallel / indicate / wrinkles / members.
4. be / that / flaps / must / they / position / in / normally / plain / rigged/ so/ are/ neutral.
5. be / always / open / drain / must / holes / kept.
6. at / crack / most / to / occur / joints / are / likely / welded.
7. fully / in / flaps / should / retracted / taxying / be.
8. on / hinges / tracks / secured / and / be / must / bolts / on / the / rollers / and.
9. beyond / holes / the / extremities / small / drilled / or /are /at /just.
10. cold / with / out / if/ gasoline / the / bearing / hard / flushed / becomes / excessively / lubricant / weather / extremely / in / it / or / may / be / aircraft / instrument / oil / with.

Exercise 11.9 *Retell the text.*

Topical test

1. Drain holes must be kept _____ .

a) open b) closed c) welded

2. What may indicate loosened rivets?

a) displacement b) failure c) incorrect setting

3. _____ members may be also broken, distorted and weakened.

a) external b) internal c) corroded

4. Buckled or displaced covering, loosened rivets may indicate _____ .

a) internal failure b) damage c) distortion

5. In case such external conditions develop, the condition of the internal structure must be _____ .

a) repaired b) replaced c) disassembled

6. Small cracks are usually caused by _____ .

a) wearing b) vibration c) severe air flow

7. Small holes are _____ at the extremities or just beyond.

a) inserted b) drilled c) welded

8. Cracked, bent or broken members of engine mounts are _____ .

a) dangerous b) permitted c) inspected

9. Cracks are most likely to occur at _____ joints.

a) riveted b) bolted c) welded

10. Elongation of bolt holes and serious vibration are caused by (with) _____ .

a) not properly tightening of clamping bolts

b) wearing of the bolts c) damage of protective coating

11. _____ .of attachment of movable surfaces must be checked periodically.

a) reliability b) security c) controllability

12. _____ are lubricated as necessary according to the lubrication chart.

a) bearings b) hinges and rollers c) clamps

13. Washing with _____ removes the lubricant.

a) oil b) fluid c) grease solvent

14. A special grease must be _____ with a usual grade when conditions become normal.

a) filled b) removed c) replaced

15. In case _____ is adjustable, the rod is so adjusted that the tab will function also as a trim tab.

a) trim tab b) balance tab c) flaps

U N I T 12

TIRES MAINTENENCE

Exercise 12.1 *Read and translate the text.*

Pneumatic airplane tire has a soft rubber inner tube inside of a fabric ply gum rubber casing. The casings are usually of the straight side wall type with from two to twelve plies. Tires should be kept clean and out of the hot sunshine if possible. Never wash a tire with gasoline, nor allow it to stand in grease or oil, as each of these materials is detrimental to rubber.

High Pressure Tires. High pressure tires are usually used on drop center rims. They carry, as a rule, from 30 to 60 pounds of air pressure, and are furnished either with or without tread.

Medium Pressure Tires. Medium or intermediate pressure tires carry from 15 to 30 pounds of air pressure, and give a much better cushioning effect than do the high pressure tires. Being larger, they offer more resistance than the high pressure tires, but this may be reduced by wheel fairings or pants.

Low Pressure Tires. Tires that carry pressures of 15 pounds or less are in the low pressure class. This tire is designed to help absorb the landing shock and to improve the airplane's performance on soft or rough ground. This wheel is usually used with a conventional shock absorber unit, but on some light airplanes it replaces that unit entirely.

Mounting Tires. Practically all modern ships are equipped with either medium pressure tires mounted on drop center rims or with airwheels. In the case of the former, the wheel flanges should be examined and any sharp corners or burrs removed with a file. The rim should be clean and free from grease or corrosion of any sort. The first bead of the casing is then mounted on to the wheel at the side opposite the brake drum. The general principle of application is to keep the applied part of the bead as far into the drop center as possible, thus putting the tire on as a buttonhole is put on a button. A flat, thin and smooth tire tool may be used if necessary. After the first bead has been worked on, the tube should be emptied of air by removing the valve core, after which the valve core is replaced and the tube is inserted in the casing with the valve stem pointed outward and located in line with the valve hole in the rim. The tube is then inflated until it is somewhere near its normal size but not stretched. The tube is then worked over the flange using a hammer with the head held in the hand and pushing the tube with the end of the hammer handle, working gradually around the rim. After the tube is on the rim insert the valve stem through the hole and pull up with the valve stem nut, but not too tight. Mount the second bead in the same manner as the first, gradually working around it and taking great care that the tube is not pinched by the tool. After the second bead has been worked onto the rim,

the tire may be pumped up to the pressure molded in the casing and the valve stem nut mounted completely.

To demount the tire, the valve nut and the valve core should be removed and the tube completely deflated. The tire beads should be loosened on both sides of the wheel. The bead on the valve side of the wheel is then removed, using two thin, smooth tire tools. The procedure in removing is just reverse of that employed in mounting the tire, the slack being obtained in the bead by keeping that portion which is not yet removed from the rim as far down into the dropped center as possible. When the first bead has been removed, the tube is taken out, care being observed to protect it from damage on any sharp corners that may be on the rim. The second bead is then removed as was the first.

Exercise 12.2 *Answer the questions.*

1. Why aren't tires allowed to be washed with gasoline?
2. What pressure do high pressure tires carry?
3. What rims do high pressure tires use?
4. What's the advantage of medium pressure tires?
5. What tires are used on soft and rough ground?
6. What side of brake drum is the first bead of the casing mounted from?
7. Are high pressure tires furnished with tread?
8. What tires are modern ships equipped with?
9. What tool is used to remove burrs on the wheel flanges?
10. How is the tire put on?
11. When should tubes be emptied of air?
12. How is a hammer used after the tube has been inflated?
13. When may tire be pumped up?
14. What should be done to demount the tire?
15. How is the second bead mounted?
16. What rims do high pressure tires use?

Exercise 12.3 *Are the sentences true or false? Correct the false ones.*

1. Tires should not be kept clean and out of the hot sunshine.
2. Gasoline, grease or oil are not detrimental to rubber.
3. Medium or intermediate pressure tires carry from 30 to 60 pounds of air pressure.
4. Practically all modern ships are equipped with either high pressure tires mounted on drop center rims.
5. The general principle of application is to keep the applied part of the bead as close into the drop center as possible.
6. After the first bead has been worked on, the tube should be inflated.
7. Mount the second bead in the same manner as the first, gradually working around it

and taking great care that the tube is pinched by the tool.

8. To demount the tire, the valve nut and the valve core should be removed and the tube completely inflated.

9. The procedure in removing is the same that employed in mounting the tire.

10. High pressure tires help absorb the landing shock.

11. The tube is inflated until it is somewhere near its normal size but a little bit stretched.

12. Any sharp corners or burrs are not removed.

13. To demount the tire, the valve nut and the valve core should be removed and the tube completely inflated.

14. The casings are usually of the straight side wall type with from two to twelve plies.

15. Pneumatic airplane has a rough rubber inner tube inside of a fabric ply gum rubber casing.

16. After the first bead has been worked on, the tube should be emptied of air by removing the valve core.

17. The tire beads should be loosened only on one side of the wheel.

Exercise 12.4 *Match English and Ukrainian equivalents.*

A	**B**
1. to demount the tire 2. furnished either or without tread 3. airplane performance 4. detrimental to rubber 5. wheel fairings 6. at the opposite side of the brake drum 7. general principles of application 8. mount the second bead 9. valve stem pointed outwards 10. burr is removed with a file 11. pinched by the tool 12. mount onto the wheel 13. free from grease or corrosion	a. задирок видаляється напилком b. шини високого тиску c. демонтувати шину d. затиснутий інструментом e. оснащений протектором або не оснащений f. загальні принципи застосування g. встановлювати другий обід шини h. з протилежного боку барабанного гальма i. без мастильного матеріалу чи корозії j. встановлювати на колесо k. обтічники коліс l. стрижень клапана спрямований назовні m. робота літака n. шкідливий для гуми

Exercise 12.5 *Find in the text the synonyms for the following words and expression.*

Damaging; supply; soak up; take the place of; fit; looseness; turn round; set; outside; grasp; pump up; landing gear; compression; pump up, install, housing.

Exercise 12.6 *In the list below find a definition for the given words.*

A	**B**
1. mount 2. wheel 3. flange	a. the force that opposes b. a metal tool with a rough surface used to smooth other surface
4. tire 5. rim 6. inflate 7. tread 8. casing 9. insert 10. slack 11. fairing 12. absorb 13. resistance 14. pneumatic 15. nut 16. file 17. grease	c. to put in or into d. the outside edge of rim of a part such as a beam or wheel e. any thick oily substance, especially one used to make part of machines work smoothly f. a cover that enclose a piece of equipment g. a rubber covering for a wheel h. operating by means of air under pressure or compressed air i. a series of pattern molded into the surface of a tire to provide grip j. a metal ring which screws on a bolt to hold it tight k. an outer layer of metal, rubber etc. that cover and protect smth such as a tire l. a circular rotating load-carrying part between tire and axle, or the whole wheel and tire assembly on which a vehicle rolls m. not tight n. the outer edge of something circular, e.g. a wheel o. to take into p. a device to improve the flown of air over the surface. q. to blow air into something and thereby increase its size

Exercise 12.7 *Complete the sentences with the words from the text.*

1. This _____ is usually used with a conventional shock absorber unit.
2. The _____ should be examined and any sharp corners or burrs removed with a file.
3. The tube is then _____ until it is somewhere near its normal size but not stretched.

4. Pneumatic airplane has a soft _____ inner tube inside of a fabric ply gum rubber casing.
5. This tire is designed to help absorb the _____ and to improve the airplane's performance on soft or rough ground.
6. After the second bead has been _____ the rim, the tire may be _____ to the pressure molded in the casing and the valve stem nut mounted completely.

7. To _____ the tire, the valve nut and the valve core should be removed and the tube completely deflated.
8. Never wash a tire with _____, nor allow it to stand in _____ or oil, as each of these materials is detrimental to rubber.
9. After the first _____ has been worked on, the tube should be emptied of air by removing the valve core.
10. The tire beads should be _____ both sides of the wheel.

Exercise 12.8 *Put the words in correct order.*
1. usually/ high/ drop/ pressure/ used/ on/ tires/ are/ used/ on/ center/ rims.
2. from/ 15/ to/ 30/ medium/ or/ intermediate/ of/ air/ pressure.
3. pressure/ tires/ carry/ pounds/ practically/ all/ modern/ ships/ are/ equipped/ with/ either/ medium/ pressure/ tires/ mounted/ on/ drop/ center/ rims.
4. the/ clean/ rim/ and/ free/ corrosion/ from/ grease/ or/ of/ should/ be/ any/ sort.
5. a/ flat/ be/ used/ thin/ and/ necessary/ smooth/ tire/ tool/ may/ if.
6. the/ inflated/ tube /is/ then/ stretched/ normal/ until/ it/ is/ somewhere/ near/ its/ size/ but/ not.
7. mount/ the/ second/ manner/ bead/ in/ the/ same/ as/ the/ first.
8. the/ tire/ loosened/ on/ beads/ should/ be/ both/ sides/ of/ the/ wheel.
9. the/ bead/ on/ the/ valve/ removed/ side/ of/ the/ wheel/ is/ then/ using/ two/ thin/ smooth/ tire/ tools.
10. this/ is/ usually/ used/ with/ a/ absorber/ shock/ unit/ but/ on/ some/ conventional/ light/ airplanes/ it/ replaces/ wheel/ that/ unit/ entirely.

Exercise 12.9 *Retell the text.*

Topical test
1. Pneumatic airplane has a soft _____ inner tube inside of a fabric ply gum rubber casing.
a) rubber b) plastic c) metal
2. They carry, as a rule, from 30 to 60 pounds of _____, and are furnished either with or without tread.

a) air resistance b) air pressure c) air tension

3. This tire is designed to help absorb _____ and to improve the airplane's performance on soft or rough ground.

a) pressure b) landing shock c) energy

4. _____ offer more resistance then other tires.

a) high pressure tires b) medium pressure tires c) low pressure tires

5. The _____ should be clean and free from grease or corrosion of any sort.

a) tyre b) drum c) rim

6. After the first bead has been worked on, the tube should be emptied of _____ by removing the valve core.

a) air b) dirt c) grease

7. The bead _____ of the wheel is then removed, using two thin, smooth tire tools.

a) on the valve side b) on the left side c) on the right side

8. To demount the tire, the valve nut and the valve core should be removed and the tube completely _____.

a) deflated b) emptied c) displaced

9. _____ the second bead in the same manner as the first, gradually working around it and taking great care that the tube is not pinched by the tool.

a) Mount b) Inflate c) Blow out

10. The tube is then inflated until it is somewhere near its normal size but not _____.

a) stretched b) pressed c) expanded

11. The _____. are usually of the straight side wall type with from two to twelve plies.

a) inner tubes b) tires c) casings

12. High _____ tires are usually used on drop center rims.

a) pressure b) tension c) resistance

13. Any sharp corners or burrs should be removed with _____.

a) a hammer b) plies c) a file

14. This wheel is usually used with a conventional _____.

a) brakes b) shock absorber c) shock strut

15. The rim should be free from _____.

a) damage b) corrosion c) bent

16. The tube is inserted in the casing with the valve stem pointed _____.

a) inward b) outward c) backward

17. The tube is then worked over the _____ using a hammer.

a) valve b) rim c) flange

18. The tire may be _____ to the pressure molded in the casing.

a) released b) pump up c) pump out

19. _____ the tire, the valve nut and the valve core should be removed.

a) to remove b) to mount c) demount

20. The inner tube may be repaired by _____.

a) plies b) the hammer c) screw driver

Listening task

Describe Picture 7.

Picture 7.

1a Describe what you can see in Picture 7. Use the words in the box.

airborne	scrape	surface	take-off	runway	landing
above	tail	attitude	main gear	nose up	

1b ☉2. 25 ***Now listen to the sample answer and answer the question***

1 Do you think the aircraft is landing or taking off? Why?

2 Why do you think the tail of the aircraft is so close to the surface?

3 What do you think will happen next?

4 What sort of flight do you think it is?

5 Who do you think took the photograph?

Plain English – Listening for gist

2a ☉2. 26 ***Listen to an air accident investigator giving a press release about an accident at take-off. <u>Underline</u> the correct information in the summary***

An Airbus A340-500 suffered (1) *engine problems* / *a tail strike* during take-off. The crew (2) *applied* / *couldn't apply* more power and the aircraft eventually (3) came to a stop / *lifted off*. After the accident, runway inspectors found (4) *one* long *scrape* / *several scrapes* along the runway and onto the runway safety area, and discovered that the aircraft had also struck the (5) *perimeter fence* / *ground installations*. The (6) *airframe* / *main landing gear* sustained major damage.

Plain English – Listening for details

2b ⊙2. 26 Listen again and complete the sentences with no more than two words

1 The _____ was pilot flying for the departure.
2 The _____ selected maximum take-off thrust.
3 The fuselage made contact with the ground _____ times.
4 The aircraft hit a high intensity _____ strobe light.
5 The _____ portion of the ILS became inoperative.
6 Runway inspectors found an _____ at the end of the runway.

Radiotelephony - Listening

3a ⊙2.27 -2.29 ***Listen to three dialogues and answer the questions (1-6) using the call signs (a-f)***

a) Goose 506	b) Taurus 823	c) Flightstar 433
d) Azure 525	e) Skybird 451	f) Easy 775

Which aircraft:

1 Needs to contact its company?
2 Initiates a missed approach procedure?
3 Reports the fuel on the ground?
4 reports a fuel leak from an aircraft?
5 Has problems in the cabin?
6 reports foreign objects on the ground?

Radiotelephony – Plain English

3b Match the beginnings (1-5) with the endings (a-e) to make sentences from the dialogue.

1	There's quite a bit of fuel on	a	find out if you can go back to gate 48?
2	We could see a leak coming	b	white vapour on the starboard side.
3	It looked as if it was trailing a	c	the right side of my taxiway.
4	It looks like construction material	d	all over the runway here.
5	Can you contact your company and	e	out the top of the right wing.

Vocabulary Check

4a Match the words in the box with the definitions.

leak (v)	trail (n) scrape (v)	material (n) debris (n)	over (adv) abrasion (n)	skin (n)

1 To rub something against a surface
2 The action of rubbing a surface hard enough to damage it
3 Liquid or gas coming out a hole or crack
4 On something and covering it
5 A substance used for a particular purpose
6 The outer layer of an aircraft
7 The broken pieces that are left when something large has been destroyed
8 A series of marks or objects left by something

4b Complete the notes with the words from 4a

Performed final runway inspection in vehicle 02 after last movements. Approx 1000 ft from end of RWY 14, found several deep (1)_____ marks, and runway construction (2)_____ spread (3)_____ the runway. Alsop found several pieces of metal (4)_____ which looked like (6)_____. Approx 100 ft further a long (7)_____ of (8)_____ liquid began and continued to end of RWY. RWY unserviceable.

Discussion

5 Discuss the question with a partner.

1 Describe a take-off incident you know of.
2 What do pilots consider when planning a take-off?
3 What things do ATCs consider when managing departing traffic?
4 What problems are associated with incorrect weight and balance?
5 What other problems can occur at take off?

U N I T 13

WHEELS AND BRAKES MAINTENANCE

Exercise 13.1 *Read and translate the text.*

Cleaning. When a wheel is removed for inspection the entire surface, both inside and out, must be cleaned thoroughly. Grease refiners and bearings are removed. Unleaded gasoline is used for cleaning the retainers, bearings, bearing cavities, and other surfaces where grease has accumulated. All parts of the wheel should be thoroughly dried in the open air before the tire and tube are remounted.

Inspection for Defects. During cleaning, all parts of the wheel must be inspected for defects, such as cracked or nicked bearing cups and scored or loose brake drum liners. The wheel is replaced if parts are bent, corroded, or cracked, or if a loose liner cannot be corrected by tightening or replacing bolts. The portion of the rim in contact with the tires must not have defects which will injure the casing or the tube. Protective coating which has been chipped, cracked, or otherwise damaged must always be repaired, since corrosion would take place rapidly in such places'. Repairs are made with the same material as was used for the original coating.

Bearing Replacements. If such defects as rough, pitted, or corroded rollers, and distorted or broken cups, cones, or cages are found after the bearing is thoroughly cleaned, the bearing must be replaced. When facilities are available some types of bearing cups may be replaced locally. They should be removed with an arbor press; or, if care is taken, with a hammer and a soft metal bar. Hammer blows must be light, and the bar must be moved about one-third of the circumference after each blow. If small wheels have left grease retainers behind the bearing cups these will be damaged beyond repair when the cup is driven out. When such units are resembled, new grease retainers must be installed behind the cups.

Disc Wheels. Disc wheels made from pressed dural discs are equipped with bronze or graphite bearings, as a general rule, although some are furnished with roller or ball bearings.

Disc wheels require very little attention beyond the protection of the dural. Damaged wheels are usually replaced as it is impractical to attempt a repair of major importance on a wheel of this type. If a graphite bearing is used it should be kept clean and free from any oil or grease. Note: Graphite bearings should never be lubricated with oil or grease, as these lubricants attack the composition of the graphite bearing, causing it to wear rapidly. If bearings other than graphite are used they should be properly cleaned and lubricated every 20 hours.

Cast Wheels. Low pressure tires are very popular. This type of tire requires a small diameter wheel. The disc wheel is not satisfactory for wheels of small diameter. For this

reason, a specially designed cast aluminum-alloy wheel is used. Cast wheels have a removable flange so that the tire may be slipped off the drum. Some wheels are cast in halves and are held together by bolts.

These, of course, must be taken apart before the tire can be removed.

A special aluminum alloy is used in manufacturing cast wheels. When the wheel casting becomes damaged to the point where excessive distortion is noted, or cracks appear in the casting, no attempt should be made toward repair. Very little repair can be made to the wheel itself, other than the replacement of brake drums and bearings.

All bearings, other than graphite bearings, should be kept properly lubricated; however, it is important to see that no excess grease is allowed to accumulate on the wheel. Excess grease is likely to get on the brake drum, which causes the brake to become ineffective, or to «grab».

Brakes. Brakes are installed on airplanes primarily for the purpose of slowing down the airplane after it has landed; however, since they can be operated individually, they are used as an aid to steering while taxying and to prevent ground looping after landing.

The brakes used on airplanes are much similar to those used on-automobiles. They are usually of the internal expanding type, that is, the brake lining is expanded to produce the braking effect by rubbing against the internal drum. When the brake is allowed to contract there is no pressure on the brake drum, therefore the wheel is free to revolve.

There are many types of brake installations, but as a rule they are installed so that they may be operated individually from the cockpit. They are usually arranged so that they may be applied with foot power by pressing the heel down, while the toes remain on the rudder pedal.

There are two types of brakes used, the mechanically operated brake and the hydraulic brake. The hydraulic brake is considered somewhat more efficient and for this reason it is usually used on larger airplanes. In principle, the operation of the two brakes are alike, the only difference being in the method of applying force to-the brake shoe.

Exercise 13.2 *Answer the questions.*

1. What is used for cleaning the retainers, bearings, bearing cavities, and other surfaces?
2. When is the wheel replaced?
3. When must the bearing be replaced?
4. What are disc wheels equipped with?
5. Why shouldn’t graphite bearing de lubricated with oil or grease?
6. How often should bearings other than graphite be cleaned and lubricated?
7. What’s the function of the brakes?
8. What can you do when the wheel casting becomes damaged?
9. What is the similarity between airplane and automatic brakes?
10. In what way are the brakes installed as a rule?

11. What types of brakes do you know?

Exercise 13.3 *Are the sentences true or false? Correct the false ones.*

1. Grease retainers and bearings are never removed.
2. Protective coating which has been chipped, cracked, or otherwise damaged must always be removed.
3. When facilities are available some types of bearing cages may be replaced locally.
4. Disc wheels made from pressed dural discs are equipped with bronze or graphite bearings.
5. Graphite cups should always be lubricated with oil or grease.
6. Low pressure tires require a large diameter wheel.
7. A special aluminum alloy is used in manufacturing cast wheels.
8. Brakes are installed on airplanes primarily for the purpose of expediting the airplane after it has landed.
9. Brakes are installed so that they may be operated individually from the cabin.
10. There are two types of brakes, the mechanically operated brake and the hydraulic brake.

Exercise 13.4 *Match English and Ukrainian equivalents.*

A	**B**
1. must be cleaned thoroughly 2. to be corrected by tightening or replacing bolts 3. original coating 4. hammer blows 5. one third of the circumference 6. grease retainers must be installed 7. where grease has accumulated 8. low pressure tires 9. slip off the drum 10. excess grease 11. to be much similar to those used on automobiles 12. to operate individually	a. первісна оболонка b. де накопичилося мастило c. зісковзнути з барабана d. має бути ретельно очищена e. покришки низького тиску f. бути дуже схожими на автомобільні g. усуватися натягом або заміною болтів h. працювати окремо i. надлишок мастила j. повинні бути встановлені маслозабірники k. одна третина кола l. удари молотка

Exercise 13.5 *Find in the text the synonyms for the following words and expression.*

Survey; shift; quickly; equipment; from the rear; demand; defense; refit; aim; eliminate; must be placed; equipped; should be held; specially intended; employed; producing; gets damaged; by means of facts; installed.

Exercise 13.6 *In the list below find a definition for the given words.*

A	**B**
1. bar	a. a thick ring of rubber filled with air and fitted round the wheel of a vehicle
2. tire	b. a thin layer of smith
3. coating	c. a thick substance used to oil the moving parts of machines
4. grease	d. devices that make it go slower or stop
5. drum	e. the force that a quantity of gas or liquid has on a surface that it touches
6. brakes	f. a long, straight, rigid piece of metal
7. pressure	g. a large cylindrical container in which fuel is kept
8. alloy	h. the damage that is caused when something is corroded
9. slow down	i. something that you use to mend an item that is damaged or is not working properly
10. corrosion	k. something that starts to move or happen more slowly
11. repair	l. go round in a circle
12. revolve	m. mixture of two or more metals, esp. of different values
13. bearing	n. a part of a machine which supports a moving part

Exercise 13.7 *Complete the sentences with the words from the text.*

1. Unleaded gasoline is used for _____ the retainers, bearings, bearing cavities.
2. During cleaning, all parts of the wheel must be inspected for _____ .
3. When facilities are available some types of bearing cups may be _____ _____.
4. If small wheels have left _____ _____ behind the bearing cups these will be damaged beyond repair when the cup is driven out.
5. _____ _____ require very little attention beyond the protection of the dural.
6. Graphite bearings should never be lubricated with _____ or _____ .
7. The _____ _____ is not satisfactory for wheels of small diameter.
8. A special aluminum alloy is used in manufacturing _____ _____ .

9. Brakes are installed on airplanes primarily for the purpose of _____ _____ the airplane after it has landed.
10. There are many types of brake installations, but as a rule they are installed so that they may be operated _____ .

Exercise 13.8 *Put the words in correct order.*
1. during/ all/ of/ cleaning/ the/ wheel/ be inspected/ parts/ for/ must/ defects.
2. are/ some/ when/ facilities/ types/ of/ available/ bearing cups/ locally/ be/ may/ replaced.
3. must /hammer/ be/ blows/ light.
4. should/ with/ graphite/ never/ be/ bearings/ lubricated/ oil/ or/ grease.
5. cast/ a/ special/ wheels/ aluminum/ is/ in/ manufacturing/ alloy/ used.
6. automobiles/ the/ used/ on/ brakes/ airplanes/ to/ those/ on/ are/ much/ similar/ used.

Exercise 13.9 *Retell the text.*

Topical test
1. _____ is used for cleaning the retainers, bearings, bearing cavities and other surfaces.
a) grease b) water c) unleaded gasoline
2. The portion of the rim in contact with the _____ must not have defects which will injure the casing or the tube.
a) tires b) bolts c) rollers
3. Protective coating which has been chipped, cracked, or otherwise damaged must always be repaired, since _____ would take place rapidly in such places.
a) crack b) corrosion c) bent
4. When facilities are available some types of bearing cups may be _____ locally.
a) repaired b) removed c) replaced
5. _____ should be removed with an arbor press.
a) bearing cups b) tires c) grease retainers
6. Disc wheels made from pressed _____ discs are equipped with bronze or graphite bearings.
a) alloy b) metal c) dural
7. If a graphite bearing is used it should be kept clean and free from any oil or _____.
a) corrosion b) grease c) cracks
8. If bearings other than graphite are used they should be properly cleaned and _____ every 20 hours.
a) lubricated b) replaced c) repaired
9. Low pressure tires require a small diameter _____ .
a) arbor b) wheel c) bolt
10. Cast wheels have a removable _____ .

a) roller b) drum c) flange

11. It is important to see that no excess _____ is allowed to accumulate on the wheel.

a) grease b) fluid c) fuel

12. _____ wheels have a removable flange so that the tire may be slipped off the drum.

a) welded b) cast c) riveted

13. When the brake is allowed to contract there is no _____ on the brake drum.

a) distortion b) pressure c) damage

14. There are many types of brake _____ .

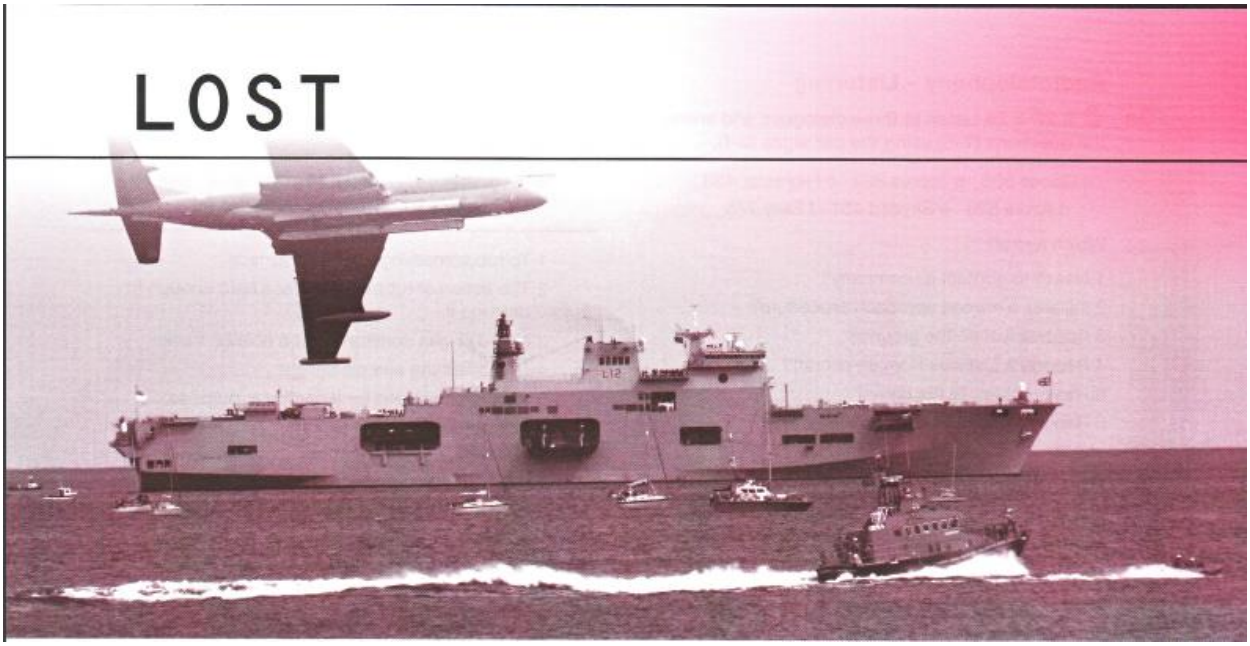
a) installation b) devices c) units

15. The _____ brake is considered somewhat more efficient.

a) mechanical b) hydraulic c) electrical

Listening task

Describe Picture 8.



Picture 8.

1a Describe what you can see in Picture 8. Use the words below.

calm vessel reconnaissance rescue turn lifeboat maritime picture navy shore military anchor slight wind

1b 2.30 Now listen to the sample answer and answer the questions.

1 Where do you think the photo was taken?

2 What do you think happened?

3 Which way is the wind blowing?

4 Where was the photographer in relation to the aircraft?

5 What do you think will happen next?

Plain English - Listening for gist

2a 2.31 Listen to a pilot describing how he became lost. Answer the questions.

1 What caused the instrument failure?
2 Why was it difficult to work with the charts?
3 How did they find out where they were?

Plain English - Listening for detail

2b 2.31 Listen again and fill in the missing words.

1 _____Paris gave us a _____heading.
2 The coffee spread across the _____.
3 The screen went blank, _____ briefly and went blank again.
4 I switched the screen off before it started smoking or popping_____ _____.
5 Paris enquired whether we were on the _____.
6 The charts were not aligned to _____ _____.
7 Paris asked us for _____.
8 We stayed on a radar heading until we picked up _____ _____.

Discussion

Discuss the questions with a partner.

1 Describe a search and rescue you have been involved in or know of.
2 Even today pilots can still get lost. Why?
3 How did pilots locate their position 20 years ago?
4 What technology exists to help navigation?
5 How do you think navigation technology will change in the future?

U N I T 14

AIRCRAFT TOWING

Exercise 14.1 *Read and translate the text.*

The aircraft can be towed by a tractor or truck with the aid of towing appliances at a speed of not over 25 km/hr. The aircraft can be towed either with the nose or tail forward.

To tow the aircraft with the nose forward, use is made of a towing bar which is secured to the nose leg lever attachment axle with the aid of a pin.

During towing, the aircrew cabin is occupied by a mechanic who controls the brakes; one man walks beside the towing bar and two men walk at the wing tips (port side and starboard). The turning angle of the nose leg at towing should not exceed ±35°.

To tow the aircraft with the tail forward use is made of a towing cable which is fastened to the shackles of the main shock struts, and a hand towing-bar which serves to control the nose wheels and which is connected to the nose leg pivot. The towing procedure is performed at a minimum speed of the towing vehicle. In this case, two men support the towing cables, two men walk at the wing tips and two men control the nose leg wheels.

The latter method of towing is resorted to for pulling the aircraft from mud or from a ditch.

The aircraft may be pushed backward by a towing vehicle with the aid of a towing bar provided towing hook height above the ground amounts to not less that 800 mm. Towing should be performed smoothly without jerks or sudden stops. It is strictly prohibited to wing the aircraft to facilitate towing.

Exercise 14.2 *Answer the questions.*

1. What can the aircraft be towed by?
2. What is the maximum towing speed?
3. What are the ways of towing?
4. What appliances are used to tow the aircraft with the nose forward?
5. What is a towing bar secured with?
6. What is the duty of a mechanic during towing?
7. Where should a mechanic be during towing?
8. What does a towing cable serve for?
9. What is the procedure of towing the aircraft with the tail forward?
10. When else is the method of towing the aircraft with the tail forward used?
11. What is used to push the aircraft backward?
12. What is prohibited while towing?

Exercise 14.3 *Are the sentences true or false? Correct the false ones.*

1. The aircraft can be towed at a speed of not less than 25 km/hr.
2. To tow the aircraft with the nose forward a towing bar is used.
3. During towing, a pilot in the aircrew cabin controls the brakes.
4. The turning angle of the nose leg at towing should not exceed ±40°.
5. A towing cable is fastened to the nose leg lever attachment to tow the aircraft with the tail forward.
6. A hand towing-bar serves to control the nose wheels.
7. The towing procedure is performed at a maximum speed of the towing vehicle.
8. Towing should be performed without jerks or sudden stops.
9. To facilitate towing it is allowed to swing the aircraft.

Exercise 14.4 *Match English and Ukrainian equivalents.*

A	**B**
1. towing appliances	a. висота буксирувального гака
2. with the tail forward	b. основні амортизаційні стійки
3. is strictly prohibited	c. кріпиться до сполучних скоб
4. lever attachment axle	d. виконуватися плавно
5. turning angle	e. буксировочні пристрої
6. use is made	f. хвостом уперед
7. method of towing	g. вісь важільного кріплення
8. is fastened to the shackles	h. кут повороту
9. towing hook height	i. за допомогою
10. to be performed smoothly	j. щоб полегшити буксирування
11. nose leg wheels	k. ручне буксирувальне водило
12. to facilitate towing	l. суворо забороняється
13. with the aid of	m. використовується
14. hand towing-bar	n. метод буксировки
15. main shock struts	o.колеса передньої стойки

Exercise 14.5 *Find in the text the synonyms for the following words and expressions.*

Airplane; attached; with the help of; left; surpass; is used to; drags; check; sludge; the last; device; right; way; carried out; supposing; is forbidden; reach; make easier; means of transportation; unexpected.

Exercise 14.6 *In the list below find definitions for the given words.*

A	**B**
1. cabin	a. machine used or intended to be used

	for flight in the air
2. starboard	b. area inside an aircraft for passenger or crew
3. towing bar	c. device used for slowing or stopping a vehicle
4. aircraft	d. rate of motion expressed as miles per hour (mph) or knots (kts)
5. vehicle	e. to draw or pull behind by a chain or line
6. brake	f. an airfoil whose main function is providing lift, especially either of two such airfoils positioned on each side of the fuselage of an aircraft
7. tow	g. the right-hand side of an aircraft as one faces forward
8. mechanic	h. a way of doing something (a series of steps to an end)
9. wing	i. fixed or rotating rod or spindle on which a wheel or group of wheels rotate
10. procedure	j. a worker skilled in making, using or repairing machines
11. axle	k. a device for transporting persons or things, conveyance
12. speed	l. the connecting rod between the aircraft and the push-back truck

Exercise 14.7 *Complete the sentences with the words from the text.*

1. The turning _____ of the _____ _____ should not exceed ± 35°.
2. A towing cable is _____ to the shackles of the main _____ _____ .
3. The aircraft can be _____ by a tractor or _____ .
4. During towing, the aircrew _____ is occupied by _____ who controls the brakes.
5. A hand towing bar serves to _____ the nose wheels.
6. The towing _____ is performed at a _____ speed of the towing vehicle.
7. Two men _____ the towing cables.
8. The latter method of towing is _____ for pulling the aircraft from _____ .
9. The aircraft may be pushed backward by _____ _____ with the aid of ____ _____ .
10. It is prohibited to _____ the aircraft.

Exercise 14.8 *Put the words in correct order.*

1. performed/ be/ jerks/ smoothly/ towing/ without/ should.
2. wheels/ two/ control/ the/ leg/ nose/ men.
3. bar/ is /a/ towing/ axle/ to/ the/ attachment/ nose/ secured/ lever/ leg.
4. or/ forward/ tail/ either/ the/ towed/ be/ aircraft/ can/ with/ nose/ the.
5. the/ beside/ one/ towing/ walks/ man/ bar.
6. is/ vehicle/ the/ of/ performed/ procedure/ speed /towing/ a/ minimum/ at/ the/ towing.
7. swing/ to/ towing/ it/ facilitate/ to/ aircraft/ the/ strictly/ is.
8. pivot/ the/ to/ connected/ is/ a/ nose/ towing/ bar/ leg/ hand.
9. cable/ struts/ of/ shackles/ towing/ the/ shock/ fastened/ the/ is/ main/ to/ a.

Exercise 14.9 *Retell the text.*

Topical test

1. During towing, the aircraft cabin is occupied by a _____ .

a) co-pilot b) mechanic

c) flight attendant

2. To tow the aircraft with the nose forward a _____ is used.

a) towing bar b) towing truck

c) towing cable

3. A mechanic in the aircrew cabin controls _____ .

a) the wheels b) the towing bar c) the brakes

4. A towing bar is fastened to the nose leg lever attachment axle with the aid of a _____ .a) lever b) cable c) hook

5. The aircraft can be towed with _____ .

a) the nose forward b) tail forward c) the nose or tail forward

6. The aircraft can be towed at a _____ of not over 25 km/hr.

a) rate b) velocity c) speed

7. The turning angle of the _____ at towing should not exceed ± 35°.

a) nose leg b) nose wheels c) towing bar

8. To tow the aircraft with the _____ forward a towing cable is used.

a) tail b) nose c) port side

9. A towing cable is secured to the _____ of the main shock struts.

a) nose leg level attachment axle b) hose leg pivot

c) shackles

10. A hand _____ serves to control the nose wheels to tow the aircraft with the tail forward.

a) towing bar b) lever attachment

c) towing cable

11. The towing procedure is performed at a _____ speed of the towing vehicle.
a) maximum b) minimum c) optimum
12. A hand towing bar is connected to the _____ .
a) nose leg lever attachment axle
b) nose leg pivot c) nose leg wheel
13. The turning angle of the nose leg at towing should not exceed _____.
a) ±25º b) ±35º c) ±30º
14. Towing _____ height above the vehicle should not be less that 800 mm.
a) bar b) hook c) cable
15. It is _____ to swing the aircraft to facilitate towing.
a) not allowed b) not demanded c) prohibited

Listening task

Describe Picture (

Picture 9.

1a Describe what you can see in Picture 9. Use the words below.

Bent dent smashed debris twisted force vehicle terminal underside wheel windscreen air stares fast avoid collision

1b 3.28 Now listen to the sample answer and answer the questions.

1 What do you think this happened?
2 What equipment will be needed to clear the area?
3 How long will it take to clear the area?
4 What effect will the incident have on airport operations?
5 Who will be involved in an investigation?

Plain English - Listening for gist

2a 3.29 Listen to a news report about a runway incursion. The questions below are missing from the interview. Match each question (a-e) to the correct place (1-5) in the recording.

a What was he doing there in the first place?

b What happened to the driver?

c So did the vehicle actually enter the runway? Aren`t there procedures to stop this happening?

d. Who was the first to realize what was happening?

e. How serious was this?

Plain English - Listening for detail

2b 3.29 Listen again and complete the sentences.

1 An aircraft nearly hit a _____.

2 The incident happened shortly after the flight was _____.

3 The driver failed to follow _____.

4 The incident happened at the intersection of _____.

5 An alarm sounded _____.

6 The driver`s radio was _____.

Discussion

1 What types of vehicles are used in aviation?

2 Should all drivers be required to have ICAO Level 4?

3 Should all ground personnel be required to have ICAO Level 4?

4 What is the role of the dispatcher?

5 How do you think ground services will change in the future?

S U P P L E M E N T

TEXTS FOR SUPPLEMENTARY READING

MAINTENANCE OF ENGINE

General

Normal and trouble-free operation of the engine largely depends on whether all types of inspection and routine maintenance services are carried out in due time and properly. All the detected defects must be immediately corrected.

The routine maintenance services, adjustment operations and elimination of defects must be recorded in the engine Service Log and accessory Certificates.

If the aircraft is to be out of use for a long time, the air inlet duct and the exhaust duct must be tightly closed with special blanking covers.

When performing maintenance operations, care should be taken not to put bolts, nuts, cotter pins, locking wire and other parts on the engine.

When performing any jobs on the power plant it is well to bear in mind that the air blow-off valves are open. Therefore, it is required to take care to prevent foreign objects from getting inside the compressor.

Check the quality of the performed services after the engine is run up.

Routing service should be carried out, only with the tools furnished in the aircraft tool kit and intended for the given operation.

Questions for Discussion

1. What does normal and trouble free operation of the engine depend on?
2. What document must the routine maintenance services be recorded in?
3. When must the air inlet duct and the exhaust duct be tightly closed?
4. What's important to bear in mind?
5. When is it allowed to check the quality of the performed services?
6. Which tools should be used for routine service?

FAULT CONDITIONS

Faults on electronic apparatus fall roughly into three groups:

(a) A fault which completely stops the apparatus from working.

(b) A fault which causes the unit to perform badly, i. e. lack of sensitivity or accuracy.

(c) An intermittent fault which causes the unit to show symptoms of either (a) or (b) above, but only at random intervals. The unit may perform well at other times.

Of these three categories (a) is probably the easiest to locate a diagnose. Many of such faults are self-indicating, i. e. meters or recorders associated with the unit give positive indications that the fault lies in a particular circuit. Visual inspection will frequently locate faults in this category, the complete failure of a transistor, valve, capacitor or resistor being easily seen by the engineer. If a careful inspection reveals nothing, a check of all voltages within the unit will often show up the faulty circuit. It is unlikely the fault will be due to ageing of components or maladjustment. Bad performance (b) may show up when the unit is given a routine check, or the operator may express concern when the unit fails to give expected results in service. Again, meters or recorders may show what part of the circuit is failing, though this is by no means as certain as in (a). Logical circuit tracing (see later) by checking on all voltages and, where possible, currents will finally lead the engineer to the faulty component. This type of work is at times tedious and always time-consuming; however, if the details of the fault symptoms and the fault itself are entered on the service record card, a second fault of this kind can be quickly located and cleared.

Questions for Discussion

1. Into How many groups do faults on electronic apparatus roughly fall?

2. Which fault is the easiest to locate and diagnose?
3. How do self-indicating faults manifest themselves?
4. What does visual inspection locate in the case of a self-indicating fault?
5. What will show up the faulty circuit if a careful inspection reveals nothing?
6. Is it likely that the fault is due to ageing of components *or* maladjustment?
7. When may the case of bad performance show up?
8. May meters or recorders show what part of the circuit is failing?
9. What will finally lead the engineer to the faulty component?
10. Why is it very important to enter the details of the fault symptoms on the service record card?

INTERMITTENT FAULTS

Intermittent faults are without doubt the worst problem that the service engineer must face. Simple causes are loose leads, plugs and sockets, and damaged switches, and these should always be checked first. When all the obvious points have been checked, and the fault recurs, an exchange chassis offers a solution in that the faulty unit can be returned to the service department and tested over a long period with meters and indicators connected to the individual circuits. In this way the fault causes little disruption of the instrumentation, and the engineer can study the faulty chassis under laboratory conditions. Printed circuits are known to produce baffling intermittent faults which can be traced to minute cracks in the thin copper strip near soldered connections. Flexing the chassis board on which the copper is deposited often reveals the fault by holding the crack open long enough for a measurement to be taken. Faults which only become apparent when the equipment has been running for some hours are commonly due to a breakdown within a component due to the increased temperature. Removing the faulty chassis and running it on the service bench quite often fails to produce the fault, as the operating temperature of the unit is much lower out of its case and in free air. A cardboard box (suitably lagged) placed over the unit while it is operating on the bench will produce conditions similar to the actual installation and accelerate the inception of fault conditions. After servicing, all units should be "soak tested" for some hours to ensure that no further adjustment or repair is required before reinstallation.

Questions for Discussion

1. What is the worst problem that the service engineer must face?
2. What are simple causes of intermittent faults?
3. In what cases an exchange chassis can offer a solution?
4. What baffling intermittent faults are sometimes produced by printed circuits?
5. What can be revealed by flexing the chassis?
6. How can possible high temperature breakdowns be revealed?
7. What is ensured by "soak testing" of the equipment before reinstallation?
8. What must the service engineer do so as not to create new problems during testing?

METHODS OF SERVICING

For the servicing of any electronic unit to be successful, the engineer must be provided with adequate test gear. Certain items of gear are essential, e. g. universal test meter, oscilloscope. Other items should be selected to suit the installation concerned. Multi-purpose instruments can quite often be purchased with advantage where a high degree of accuracy is not always required, e. g. resistance, inductance, capacitance (RIC) bridge, pulse/sine wave generator, FM/AM signal generator. Maintenance of the test gear itself should not be overlooked, and instruments should be checked against a standard or returned to the manufacturer for overhaul and calibration at least once each year.

Questions for Discussion

1. What must the engineer be provided with for the servicing to be successful?
2. What items of gear are essential?
3. What are the main functions of universal test meter?
4. What can oscilloscope do for the engineer?
5. In what cases the purchase of multi-purpose instruments can be advantageous?
6. What specific meters do multi-purpose instruments usually contain?

7. What parameters does RIC bridge measure?
8. What are pulse/sine wave generators used for?
9. How often must the test gear itself be checked against a standard?
10. In what cases the test gear is returned to the manufacturer for overhaul?

NEW COATING TECHNIQUES

Flame and plasma coating of metallic and ceramic films as a protection against corrosion and abrasion has established itself in recent years in the aircraft engine manufacturing field as a reliable and economic coating technique. For example, a valve ring with a diameter of about 340 mm is made of titanium alloy with a tungsten-cobalt abrasion protection coating applied to the inner and outer surfaces by plasma coating. To avoid adverse intrinsic stresses in the metal ceramic coating, the valve ring is heated on the inner side during the spraying and cooled during the final spray of the outer side. The surface is completed by abrasive methods. A new development in the thermic spraying field is demonstrated by vacuum plasma coating. Thanks to increased particle velocity and a gas-free atmosphere, comparatively dense, oxide-free and closely adhering coatings can be produced.

The chemical deposition from the gas phase is often used to produce abrasion- and corrosion-resistant coatings. One major difficulty is posed by the high-temperature corrosion-protection films for turbine blades. All currently employed coatings are based on aluminium. Since the operating temperature and life of these coatings are limited new coating methods are now under development.

Questions for Discussion

1. What coating has been established against corrosion and abrasion?
2. How has it established itself?
3. What is a valve ring made of?
4. What is a diameter of a valve ring?
5. What is done to avoid adverse intrinsic stresses in the metal ceramic coating?
6. What is the surface completed by?
7. What is demonstrated by vacuum plasma coating?
8. What can be produced thanks to increased particle velocity and a gas-free atmosphere?
9. What is often used to produce abrasion-and-corrosion-resistant coatings?
10. What is one major difficulty posed by?
11. What are all currently employed coatings based on?

DEFINED SURFACE CONDITION

The latest significant area of engine manufacturing technology is that of surface techniques. Engine components, particularly the high-pressure compressor and the turbine, are subjected to complex mechanical, thermic and chemical stresses. It is necessary, therefore, that these are countered by developing specific properties in the materials employed on the basis of the stresses to which these will be subjected. This is done in the areas which are mainly subjected to mechanical stresses by producing a defined surface condition, and in the areas subjected to corrosion, erosion and abrasion by producing material bonds for which it is generally sufficient that the principal material is subjected to the basic stress and the layer to the complex stress. Thermic injection and chemical separation during the gaseous phase are normally employed nowadays for the deposition of safety layers.

Reliable manufacture of a defined surface condition depends on various mechanical processes such as rolling or shot peening, which arc used to generate intrinsic stress.

Questions for Discussion

1. What is the latest significant area of engine manufacturing technology?
2. What engine components are particularly subjected to complex mechanical, thermic and chemical stresses?
3. What are these countered by?
4. What areas is this done in?

5. What is normally employed nowadays for the deposition of safety layer during the gaseous phase?

6. What does reliable manufacture of a defined surface condition depend on?

LOGICAL FAULT FINDING

Different types of equipment will require a different approach to fault finding; however, a generalized system is given here which, if applied to most faulty units, will greatly assist the engineer to locate the trouble.

1. Check that no short circuit exists on the main supply leads a.c. and d,c. circuits, plug in the unit and allow it to warm up.

2. Study the unit carefully; in particular, observe all components for signs of overheating. Note all meter readings, closing of relays, and movement of servo-motors. Pay particular attention to the striking of neon-regulators, and to any component that is discoloured or is dripping wax. While transistor circuits running at lower powers than equivalent valve circuits are less demonstrative of faults, resistors should be checked for any signs of overheating. It cannot be over emphasized that careful observation of the faulty unit will reveal faults almost as often as checks carried out with complex test gear.

3. Check all supply voltages starting with the a.c. input to the mains transformer and working through the d.c. supplies to all stages of the unit. Measure anode, screen grid, and cathode voltages on valves and emitter, base and collector voltages (and preferably currents) on transistor units.

4. Check through the signal path by injecting suitable voltages and frequencies at the input terminals of each stage, starting with the output stage and working back. Observe the output signal of the final stage on an oscilloscope. Alternatively, where the input signal to a piece of equipment is "specialized", that input signal should be used; check the unit stage by stage using an oscilloscope and probe, working forwards from the input. Information obtained from a series of tests similar to those shown above may not locate the faulty component, but it will specify the general circuitry in which the fault lies. Reference to the circuit diagram should now resolve the fault down to one or two components which can be checked individually.

Questions for Discussion

1. Is a generalized system of logical fault finding applicable to aviation equipment?
2. Will this system assist the engineer in locating the trouble?
3. How to make sure that no short circuits exist on the main power supply leads?
4. What will the engineer do in looking for any signs of overheating?
5. To what particular signs of overheating will the maintenance engineer pay special attention?
6. In what order will the maintenance engineer check all supply voltages?
7. Why the signal path is always checked starting with the output stage and moving to the input?
8. Why should the engineer finally refer to the circuit diagram?

FLAW-DETECTOR FOR FASTENER HOLES

A new eddy current flaw detector detects and analyses cracks and Haws in fastener holes drilled in aircraft structural elements. Fully motorized and portable, the new detector employs a rotating scanning probe which revolves spirally within the hole while maintaining contact with the walls. An audible tone signals the detection of defects down to 0.127 mm in depth, while a print-out strip signals the exact where-abouts of the defect. The new system is superior to traditional hand-scanning techniques in speed, accuracy, sensitivity and repeatability.

Questions for Discussion

1. What does a new eddy current flaw detector detect and analyze?
2. What does the new detector employ?
3. How does it revolve?
4. What can the detector signal? What’s the depth of detection?

5. What does a print-out strip signal?
6. What is the difference between the new system and traditional hand-scanning techniques?

SPARES

Spare part is defined as any part, component or subassembly kept in reserve for the maintenance and repair of major items of equipment. Initially a small stock of spares should be held; these should include such things as transistors, valves, electrolytic capacitors, variable resistors and pilot lamps, plus charts, pens, and inks required for recorders. Lists of spares held for each unit should be kept up-to-date, and modified as usage determines which components are most likely to fail in service.

Questions for Discussion

1. What stock of spares should be held initially?
2. What spare parts should the initial stock include?
3. What is the function of transistors in electronics?
4. What are valves for?
5. In what circuits are used electrolytic capacitors?
6. What do variable resistors do with signals?
7. What do pilot lamps indicate?
8. In what devices are used charts, pens and inks?
9. What is meant by keeping lists of spares up-to-date?
10. Which electronic components are least reliable and often fail?
11. What are the most frequent causes of failures of electronic equipment?
12. Do redundant devices make electronics more reliable?

SPECIAL TOOLS FOR AVIATION WORK

A complete range of first quality aviation mechanic tools in U.S., metric, and British Standard sizes helps to handle maintenance and repair work on any and all types of aircraft. Tools include socket wrenches and handles; open end, box and combination wrenches; torque wrenches, screw drivers, pliers, gear pullers, tool chests, plus a wide range of special tools for aviation work.

Questions for Discussion

1. What helps to handle maintenance and repair work?
2. What do the tools include?

WORD LISTS
UNIT 1 MAINTENANCE OF AN AIRCRAFT

advantageous [XdvEn7teid3Es]	сприятливий, вигідний
airworthiness [7BE6wE:9ins]	придатність, готовність літака до польоту
Base check	періодична (базова) перевірка
bent	згин
buckles [7bVklz]	замки
cleanliness [7klenlinis]	чистота
cleanness [7kli:nnis]	чистота
coating [7kEutiN]	шар
combine [kEm7bain]	об'єднувати
corroded [kE7rEudid]	іржавий
definite [7definit]	визначений
disassemble [7disE7sembl]	демонтувати
exercise [7eksEsaiz]	виконувати
for evidence [7evidEns]	на наявність
foresee (foresaw, foreseen) [fO:7si]	передбачати, припускати
grease [7gri:z]	мастило
injury [7ind3Eri]	пошкодження
major [7meid3E]	важливий
mean [mi:n]	означати
measurement [7me3EmEnt]	вимірювання
minor [7mainE]	незначний
originate [7Erid3ineit]	створювати
overhaul [EuvEhOl]	капітальний ремонт
permit [pE:7mit]	дозволяти
personnel [6pEsE7nel]	персонал
policy [7pOlisi]	політика, настанова, курс
protective [prE7tektiv]	захисний
repair [ri7pBE]	ремонтувати
replacement [ri7pleismEnt]	заміна
rivet [7rivit]	заклепка
seams [7si:mz]	місце з'єднання
station check	періодична перевірка
straps [7strXps]	ремені
webbing [7webbiN]	перемичка

UNIT 2 PREFLIGHT MAINTENANCE

attachment [E7tXtSmEnt]	кріплення
blank covers [blXNk kVvEz]	заглушки
carry out = perform [7kXriaut]	виконувати

determine [di7tE:min] визначати

dispense [dis7pens] роздавальний, розподільний

examine [ig7zXmin] оглядати

gauze [7gOz] сітка

guard [7ga:d] охороняти, захищати

hatch [hXtS] люк

inspect [in7spekt] оглядати

install in place [in7stO:l] установлювати на місце

joint [7d3Oint] з'єднання

landing lights [7lXndiN 7laits] посадкові фари

lock замок, фіксатор

maintenance [7meintEnEns] технічне обслуговування

navigation lights навігаційні вогні

plug [plVg] кран

premature [prEmE7tju:E] передчасний

prior [7praiE] до

provide for [prE7vaid] передбачати

readiness [7redinis] готовність

reliable [ri7laibl] надійній

remove [ri7muv] прибирати

routine [ru:7ti:n] установлений, звичайний

separate [7seprit] окремий

serviceability [6sE:vise7biliti] придатність

servicing обслуговування

thoroughly [7QVrEli] ретельно

unit [7junit] агрегат

wardrobe [7wO:drEub] гардероб, шафа

with a view [vju:] з метою

UNIT 3 POSTFLIGHT INSPECTION

add [7Xd] додавати

attach [E7tXtS] кріпити

completion [kEmp7li:SEn] завершення

cowl [7kaul] капот, обтічний кожух

duration [djuE7reiSEn] тривалість

fuel metering unit автомати дозування палива

inspect for перевіряти на наявність (чого-небудь)

lid кришка

link [7liNk] з'єднувати

locking devices стопорні пристрої

nick [7nik] вибоїна,

noise [7nOiz] шум

prolonged [prEu7lONd] тривалий

securely [si7:kjuEli] надійно

undue [Vn7dju:] невідповідний, незвичайний

UNIT 4 FUEL SERVICING

accomplish [E7kOmpliS] виконувати

arrange [E7reid3] розташовувати

bag tank м'який бак

battery flash light ліхтар на батарейках

centralized fuelling [7sentrElaizd 7fjuEliN] централізована заправка

coarse fuel filter фільтр грубої очистки

deenergize [di7enEd3aiz] знеструмлювати

dip stick мірна лінійка (рівня палива)

drain зливати

drain cock [7drein 7kOk] зливний кран

drain opening зливний отвір

dust [7dVst] пил, порох

explosion proof extension light вибухобезпечний переносний ліхтар

fill [fil] наповнювати

filler neck заправна горловина

float level gauge [7flEut 7level 7geid3] поплавковий паливомір

fuel flow meter паливний витратомір

fuel servicing truck паливозаправник

fuel tank паливний бак

fueling panel панель заправки

fueling signalling unit сигналізатор заправки

ground [7graund] заземлювати

grounding conduits [7kOndit] кабелі заземлення

grounding pin штир заземлення

intake отвір

ladder [7lXdE] драбина

moisture [7mOistSE] волога

servicing truck [7trVk] заправна машина

subsequent [sVb7sikwEnt] наступний

truck fuelling pipe union труба з'єднання із паливозаправником

vent вентиляційний

UNIT 5 OIL SERVICING

servicing [7sE:visiN] обслуговування, заправка рідиною

oil cooler маслорадіатор

dispense [dis7pens] роздавати

dispense gun розподільний пістолет

drain [7drein] зливати
drain plug зливний кран
feathering pump [7feQEriN pVmp] флюгер-насос
filler neck [filE nek] заливна горловина
front casing лобовий картер
gauze [7gO:z] сітка
manually [7mXnjuEli] вручну
oil servicing truck маслозаправник
plug [plVg] кран
propeller governor регулятор повітряного гвинта
protective [prE7tektiv] захисний
through [7Qru] через
tube [tju:b] трубка, труба
valve клапан, вентиль, кран

UNIT 6 HYDRAULIC SYSTEM CHARGING

accommodate [E7kEmEdeit] вміщувати
charge [7tSa:d3] заправляти
depressurize [dip7reSEraiz] розгерметизувати, стравити тиск
discharge [dis7tSa:d3] розрядити
drain cock кран зливу
entire [in7taiE] цілий, увесь
except [ik7sept] окрім
fillet [7filit] зализ
flow [7flou] течія
ground hydraulic unit наземний заправник гідравлічною сумішшю
hose [hEuz] шланг
hydraulic fluid гідравлічна рідина
in case у випадку, у разі
jack [7d3Xk] домкрат
nitrogen [7naitrEd3En] нітроген
pipe union трубне з’єднання
place [7pleis] встановлювати
pressure line лінія нагнітання
proper [7prOpE] вірний
rear [7riE] задній
remainder [ri7meindE] залишок
suction [7sVkSn] всмоктування
the latter останній

UNIT 7 FLIGHT CONTROL SYSTEM MAINTENENCE

aircraft instrument oil [7BEkra:ft 7instrument O7il] авіаційне (приладове масло)
ball bearings [7bO:l 7bBEriN] кульковий підшипник
carrying hook [7kXriN 7huk] захват для перенесення (гачок)
cleaning solvent (s) [7kli:niN органічні розчинники (очищення

7sOlvEnt] розчинником)

control cable (s) [kEn7trEul 7keibl] контрольний кабель (трос управління)

corrosion [kE7rEu3n] корозія, іржавіння, окислення

cotter pins [kOtE 7pin] шплінт, розлучна чека

excessive wear [ik7sesiv 7weE(r)] надмірний знос

extremely cold weather [ik7stri:mei] надзвичайно холодна погода

failure [7feiljE(r)] поломка, відмова, несправність

fairlead [fBE(r) 7li:d] труба для протягування кабелю

fittings [7fitiN] фітинг, патрубок

flashlight [7flXSlait] кишеньковий електричний ліхтар

flight control(s) [flait 7kEn7trEulz] орган(и) управління польотом

frequent inspection [7fri:kwEnt 7in7spekSn] частий огляд (перевірка)

gasoline [7gXsEli:n] бензин

grease [gri:s] консистентне мастило

hazard [7hXzEd] ризик, небезпека (шкідливий чинник)

inch [7intS] дюйм

inspection [in7spekSn] перевірка, контроль, огляд

internal damage [in7t3:nl 7dXmid3] внутрішнє пошкодження, руйнування (дефект)

jam [7d3Xm] заклинити, защемити, затиснути

length [7leNQ] довжина

linkage [7liNkid3] з’єднання

load [lEud] вантаж, навантаження

lock nuts [7lOk 7nVt] стопорна гайка (контргайка)

lubrication [6lu:bri7keiSn] мастило (змащування)

oxygen mask [7oksid3En 7ma:sk] киснева маска

pulley [7puli] шків

push-pull rod [puS6pul6rOd] тяга

receptacle [ri7septekl] роз’єм

rust [7rVst] іржа

rust-preventive compound [rVst7pri7ventiv kEm7paund] антикорозійна речовина (склад)

serviceable [7sE:visebl] міцний, придатний

tension [7tenSn] натяг

to coil [kOil] намотувати, обмотувати мотузком (складати в бухту)

to prevent [pri7vent] запобігати (попереджувати)

to replace [ri7pleis] замінити, заміщати

to warn [wO:n] попереджувати

washed out [woS 7aut] змивати

wire [7waiE] дріт, трос, дротяне з’єднання

U N I T 8 HYDRAULIC MAINTENANCE

at a glance [gla:ns] візуально, приблизно

cartridge type filter [7ka:trid3 taip] фільтр картриджного типу

drain [7drein] зливати

filler cap [7filE kXp] кришка заливної горловини

flush [7flVS] промивання потужним струменем

funnel [7fVnl] воронка, літник (техн.

gage = gauge [7geid3] вимірювальний прилад

grit [7grit] пісок, гравій

hydraulic system [haid7rO:lik 7sistem] гідравлічна система

inspect [in7spekt] оглядати, проводити огляд

leak [li:k] витік

line filter лінійний фільтр

manual [7mXnjuEl] керівництво

manufacturer [6mXnju7fektSErE] виробник

mar пошкодження

mesh отвір

plug [7plVg] пробка

precaution [pri7kE:SEn] попередження

replace [ri7pleis] замінювати

reservoir [7rezErwa:] резервуар

scraper type filter [sk7reipE] фільтр скребкового типу

screen [7skri:n] заслінка

screw top [skru: tOp] такий, що відкручується вгору

solvent [7sOlvEnt] розчинник

sounding rod [7saudiN rOd] стрижень зондування, зонд

tank [7tXnk] бак

thoroughly [7QVreli] ретельно, ґрунтовно

UNIT 9 INSPECTING A HYDRAULIC SYSTEM
PREFLIGHT INSPECTION

accumulator preload [E7kju:mjE6leitE pri7loud] зарядка акумулятора

air pressure [6BE7preSE] тиск повітря

brakes [7breiks] гальма

build up [7bild Vp] створювати

chafing [7tSeiSiN] затискання

cut in вмикати

cut out вимикати

designate [7dezigneit] встановлювати

determine [di7tE:min] визначати, встановлювати, обумовлювати

deterioration [di6tiriE7reiSn] пошкодження, зношування, спрацьовування

engine pump [7end3in pVmp] насос двигуна

extended position [iks7tendid pE7ziSEn] випущене положення

flexible line [7fleksEbl] гнучкий трубопровід

fluid level [7fluid levl] рівень рідини

general procedure [7d3enErEl prE7si:d3E] загальна процедура

hand pump ручний насос

hydraulic line [hai7drO:lik lain] трубопровід гідравлічної системи

hydraulic system [hai7drO:lik sistim] гідравлічна система

increase [in7kri:s] збільшувати, підсилювати

indications of hardening [6indi7keiSEnz Ev7 ha:dniN] наявність затвердіння

leak [li:k] витік

main pressure gage [7preSE 7geid3] манометр основний системи

mounting [7mauntiN] кріплення

oil [7Oil] змащувати, мастити

packing glands [7pXkiN 7glXndz] прокладки

piston rod [7pistEn rOd] шток поршня

pitting [7pitiN] поглиблення

pressure regulator valve [7preSE 7regjuleitE vXlv] редукційний клапан тиску

reduce [ri7dju:s] зменшувати

reservoir [7rezEvwa:] бак

rigid line [7rid3id] жорсткий трубопровід

rust [7rVst] іржа

scratch [7skrXtS] дряпати

seals [si:lz] сальники

selector switches [si7lektE 7switSiz] перемикачі

unit [7ju:nit] агрегат

windshield wiper [7windSi:ld 7waipE] “двірник” лобового скла

wiper blades [7waipE 7bleidz] лезо “двірника” (склоочищувача)

UNIT 10 LANDING GEAR MAINTENANCE

advisable [Ed7vaizEbl] доречно, доцільно

air duct вентиляційний канал, повітропровід

air pressure тиск повітря

air-oil shock strut повітряно-масляний амортизатор (шасі)

authorize [7O:QEraiz] дозволяти

base [7beis] база, низ, основа

bay [7bei] відсік, отвір, місце

bent [7bent] вигнутий

bolt hole отвір для болту

brace [breis] скоба

carbon tetrachloride [7kA:bEn 7tetrE7klO:raid] чотири хлористий вуглець

cease [7si:s] припиняти(ся)

collapsed [kE7lXpst] зруйнований

copper [7kOpE] мідний

cord [kO:d] мотузка, шнур,

core [kO:] серцевина, ядро

corrosion [kE7rEu3En] корозія, іржа

corrosive agent [kE7rEuziv 7eid3Ent] корозійна речовина

cowling doors [7kauliN] стулки шасі

cracked [7krXkt] тріснутий

cycle [7saikl] цикл (робіт)

deflated [di7fleitid] спущений

deflation [di7fleiSEn] стравлювання повітря, газу

derivative [di7rivEtiv] хімічна похідна (речовина)

deterioration [di6tiEriE7reiSEn] знос, зношування

distinct [dis7tiNkt] особливій, виразний

duct [7dVkt] труба, канал, прохід

eliminate [i7limineit] усувати

elongate [7i:lONgeit] довгастій

employ [im7plOi] застосовувати

essentially [i7senSEli] істотно

excessive [ik7sesiv] надмірний

extended [ik7stendid] випущений

filler plug заливна (заправна) пробка

fitting gasket ущільнюючий сальник

fittings [7fitiNz] фітинги

fluid level [7flu:id] рівень рідини

flush [7flVS] начищати, полірувати

frayed [7freid] протертий, пошарпаний

gasket [7gXskit] прокладка, сальник

grease [gri:s] змащувальна речовина

handbook [hXndbuk] керівництво, довідник

hoist [7hOist] підйомник

hose [7hEuz] шланг

hydraulic fluid [hai7drO:lik] робоча рідина

hydrochloric acid [6haidrEu7klO:rik 7Xsid] соляна (хлористоводнева) кислота

improper [im7prOpE] недоречний, неправильний

inflation [in7fleiSEn] надування, наповнення

inserting [in7sE:tiN] вставка

jack [7d3Xk] домкрат

kerosene [7kerEsin] гас

landing gear [7lXndiN6giE] шасі

landing gear position indicator покажчик положення шасі

leak [7li:k] витікання, витік

locking device [di7vais] стопорний пристрій
loosely [7lu:sli] вільно
lubrication [6lu:bri7keiSn] мастило
naphtha [7nXfQE] гас, сира нафта
nose gear передня опора шасі
packing gland сальник, сальникова коробка
packing nut герметизуюча гайка
petroleum-base [pi7trEuljEm] на нафтовій основі
piston [7pistEn] поршень, клапан
pliers [7plaiEz] плоскогубці
plug [7plVg] пробка
rapid [7rXpid] швидкий, стрімкий
readily [7redili] швидко, без затримки
relieve [ri7li:v] деблокувати, послаблювати
replace [ri7pleis] замінювати
replenish [ri7pleniS] поповнювати(ся)
retarded [ri7tA:did] уповільнений, крайній
retractable [ri7trXktEbl] такий, що прибирається
reversal [ri7vE:sl] зворотній рух, реверсування
rock [rOk] качати, трясти
rubber [7rVbE] гума, покришка, шина
seal [si:l] ущільнювати, герметизувати
securely [si7kjuEli] надійно, міцно
seepage [7si:pid3] просочування, витікання, витік
shock strut амортстійка
soapy [7sEupi] мильний
straight-thread type циліндрична різьба

sufficient [sE7fiSEnt] достатній
technical order [7teknikEl] інструкція по експлуатації та технічному обслуговуванню
tension [7tenSEn] натяг, напруга
thread [7Qred] різьба, крок (гвинта)
throttle [7QrOtl] дросель
throughout [Qru:7aut] на всьому протязі
tighten [7taitn] затягувати, ущільнювати
tightening затягнення, підтягнення
trapped захоплений, такий, що накопичується
unscrew [7Vn7skru:] відгвинчувати
valve [7vXlv] клапан, золотник, стулка
valve assembly [E7sembli] клапанний блок, клапанний пристрій
well [7wel] ніша, отвір
wire [7waiE] дріт
wrench [rentS] гайковий ключ

U N I T 11 WINGS MAINTENENCE

accumulate [E7kju:mjuleit] накопичувати, накопичуватися

adjustable [E7d3Vstebl] регульований

aircraft instrument oil авіаприладове масло

aluminum-alloy [6Xlju7minjEm XlOi] алюмінієвий сплав

assembly [E7sembli] установка, монтаж, збірка

attachment [E7tXtSmEnt] кріплення

authorized [7O:QEraizd] уповноважений

balance tab сервокомпенсатор (керма)

beyond [bi7jOnd] понад

bolt [bOlt] болт, засув, засувка

buckle [7bVkl] згинатися (під тиском)

buckled (adj) [7bVkld] вигнутий

chip [tSip] стругати, обтісувати

chipped (v) [tSit] обтесаний, обструганий

clamp [klXmp] хомут, затиск

dent (v) [dent] вдавлювати вибоїну, вм'ятину; вминати

dented (adj) [7dentid] увігнутий, втиснутий

discern [di7sE:nt] роздивитися

drain hole [drein7houl] дренажний отвір

drill (v) [dril] свердлити

elongation [6i:lON7geiSEn] подовження

engine mount [7end3in meunt] кріплення двигуна

entire [in7taiE] цілий, суцільний

evenly [7i:v(E)nli] рівномірно, рівно, гладко

evidence [7evidEns] очевидність, ознака

excessively [ik7sesivli] надмірно, надлишково

expose (v) [iks7pouz] залишати незахищеним, виставляти

exposed (adj) [iks7pouzd] такий, що піддається дії (корозії і т.д.)

extremity [iks7tremiti] кінець; край

flap [flXp] закрилок; щиток

flush (out) [flVS] промивати потужним струменем

Fowler flap [faulE 7flXp] закрилки Фаулера

frame [freim] каркас; корпус

fuselage [7fju:zila:3] фюзеляж

gasoline [7gXsEulI:N] газолін; бензин

grade [7greid] сорт

grease [gri:s] змащувальний матеріал

hinge [7hind3] шарнір

injury [7ind3Eri] шкода, пошкодження, псування

internal [in7tEnl] внутрішній

investigate [in7vestigeit] досліджувати, вивчати, ретельно оглядати

loosen [7lu:sn] ослабляти

lubricate [7l(j)u:brikeit] мастити

maneuver (n) [mE7nu:vE] маневр

maneuver (v) маневрувати

mount [7maunt] рама, кронштейн

movable surface [7mu:vEbl 7sE:fis] рухома поверхня

occur [E7kE:] траплятися, виникати

patch (n) [pXtS] латка

(v) латати, ставити латки

permit [pE7mit] дозволяти, давати можливість

personnel [6pEsE7nel] персонал

plain flap [plein 7flXp] простий (безщільовий закрилок)

pocket [7pOkit] кишеня, поглиблення

protect [prE7tekt] захищати, зашкоджувати, запобігати

readily [7redili] швидко, легко

retract [ri7trXkt] прибирати (шасі)

rivet [7rivit] заклепка

rig [rig] пристосування, пристрій

rod [7rOd] тяга, шток, шатун

roller [7roulE] ролик, вал, циліндр, що обертається

rough [7rVf] грубий

rust (n) [7rVst] ржа, іржа

(v) іржавіти, піддавати корозії

secure [si7kjuE] закріплювати, прикріплювати

sheet [Si:t] лист

skin [skin] обшивка (повітряного судна)

solvent [7sOlv(E)nt] розчинник

split flap щілистий закрилок, (що складається з 2-х секцій)

springy [7spriNi] пружний

straighten [7streitn] випрямляти

sufficient [s(E)7fiS(E)nt] достатньо

tab [tXb] сервокомпенсатор, тример

thoroughly [QVreli] ретельно, ґрунтовно, як слід

trim-tab [7trim7tXb] тример

violent [7vEiElEnt] неправильний, викривлений

warping [7wO:piN] деформація, короблення

welded joint [7weldid d3Oint] зварний шов

wooden block [7wudn 7blOk] упорна колодка (під колесо)

worn [wO:n] зношений, потертий

wrinkle [7riNkl] тріщина

UNIT 12 TIRES MAINTENENCE

absorb [7Eb7sO:b] поглинати, абсорбувати

absorber [Eb7zO:b(E)] амортизатор, фільтр, поглинач

airwheel [BE(h)wi:l] колесо з шиною низького тиску

application [6Xpli7kei(S)n] застосування

apply [E7plai] застосовувати

bead [7bi:d] борт шини

brake drum [breik drVm] барабанне гальмо

burr [bE:] задирка

casing [7keisiN] обшивка

conventional [kEn7ven(t)S(E)n(E)l] звичайного типу

cushioning effect [7kuS(E)niN i7fekt] амортизуюча дія

deflate [di7fleit] викачувати, випускати повітря

demount [di7maunt] демонтувати, розбирати

detrimental [6detri7ment(E)l] шкідливий, збитковий

drop center [drop 7sentE] глибокий обід

entirely [in7taiEli] повністю

fabric [7fXbrik] структура, текстура

fairing [7f3EriN] обтікач

file [7fail] напилок

flange [7flXnd3] фланець

furnish (v) [7f3i:niS] постачати

gasoline [7gXsEuli:n] бензин

grease [gri:s] змащення, мастильний матеріал

gum [7gVm] живиця, смола

high pressure tires [hai preSE taiE] шини високого тиску

insert [in7sE:t] вставляти, вкладати

landing shock [7lXndiN 7Sok] удар під час посадки

loosened [7lu:s(E)nd] послаблений

low pressure tires [7lEu 7prefE 7taiE] шини низького тиску

medium or intermediate pressure tires [7mi:diEm O: 7intEmidiEt preSE taiEz] шини середнього тиску

molded [7mEuldid] заформований, відлитий

mount [7maunt] кріпити, встановлювати

nut [7nVt] гайка

obtain [Eb7tein] отримувати, здобувати

outward [7autwEd] зовнішній

pants [7pXnts] обтікачі коліс

pinched [7pintSt] затиснутий

ply [plai] згин, складка

pneumatic [nju:mXtik] пневматичний

pound [7paund] фунт

pull up [7pul Vp] потягнути

pump up [7pVmp Vp] накачувати (шину)

replace [ri7pleis] замінювати

resistance [ri7zistEnts] опір

reverse [ri7vE:s] реверсувати, змінювати напрямок

rim [7rim] обичайка, обід

rubber [7rVbE] гумовий, гума

slack [7slXk] проміжок, натягнутість

stretch [7stretS] тягнути, розтягувати

take out [7teik aut] виймати

tread [7tred] протектор

tube [7tju:b] труба, камера

unit [7ju:nit] одиниця, блок, секція

valve core [7vXlv 7kO:] осердя клапана

valve hole [7vXlv 7hEul] отвір для клапана

valve stem [7vXlv 7stem] стрижень клапана

wheel [7wi:l] колесо

work on [7wE:k on] діяти, впливати на

work over [7wE:k 7EuvE] переробляти

UNIT 13 WHEELS AND BRAKES MAINTENANCE

accumulate [E7kju:mjE6leit] накопичувати

alloy [E7lOi] сплав

arbor [7A:bE] вал, вісь

ball bearing [bO:l 7bBEriN] шарикопідшипник

bar [7bA:] стрижень

bearing [7bBEriN] підшипник

bearing cavity [7kXviti] порожнина підшипника

bearing retainer [ri7teinE] сепаратор підшипника

bearing cup [kVp] зовнішнє кільце підшипника

blow [blOu] удар

bend (bent, bent**)** [bent] згинатися, гнутися

beyond [bi7jOnd] поза …(чим-небудь)

bolt [7bOlt] болт, стрижень, палець, затвор

cage [7keid3] обойма (підшипника)

casing [7keisiN] кожух, оболонка

cast [7kA:st] литво

circumference [sE7kvmfir(E)ns] коло

coating [7kEutiN] покриття, оболонка

cone [7kOun] конус

corrode [kE7reud] роз'їдати, іржавити

cracked [7krXkt] тріснутий

cup [7kVp] кільце

chip [7tSip] стругати, стружка

defect [7di:fekt] несправність, поломка

distort [di7stO:t] скривлювати, викривляти

distortion [di7stO:Sn] скривлення, викривлення

drive out [7draiv 6aut] вибивати, витісняти

drum [7drVm] циліндр
dural [dju7rXl] дюралюмінієвий
entire [in7taiE] цілий, увесь
excessive [ik7sesiv] надмірний, надлишковий
flange [7flXnd3] фланець
grease [7gri:s] мастильна речовина
grease retainer [ri7teinE] маслозабірник
hammer [7hXmE] молоток
halves [7hA:vz] половинки
install [in7stO:l] встановлювати, монтувати
liner [7lainE] гільза, втулка
loose [7lu:s] незакріплений
lubricant [7lu:brikent] мастило
lubricate [7lu:brikeit] мастити, змазувати
manufacture [mXnju7fXktSE] виробництво
nick [7nik] забоїна, вм'ятина
otherwise [7V9Ewaiz] інакше
pitted [7pitid] покритий корозією
portion [7pO:Sn] частина, частка, порція
rapidly [7rXpidli] швидко
remount [7rimaunt] знов монтувати, знову вмонтовувати
resemble [ri7zembl] бути схожим, мати схожість
retainer [ri7teinE] замок, шайба, стопор
rim [rim] обід, фланець, бандаж, кільце
roller [7rOulE] циліндр, вал, ролик
rough [7rVf] нерівний
scored [7skO:d] пошкоджений, ушкоджений
slip off [7slip Ev] зісковзнути,
tighten [7taitEn] затягувати
tube [7tjub] труба, камера шини
unleaded gasoline [Vn7li:did 7gXsEli:n] без свинцевий бензин

UNIT 14 AIRCRAFT TOWING

amount [E7maunt] дорівнювати, досягати, доходити до
angle [7XNgEl] кут
appliance [E7plaiEns] пристосування, пристрій, прилад, приналежність
attachment [E7tXtSmEnt] кріплення, приєднання
axle [7ksEl] вісь
ditch [7ditS] канава, кювет
exceed [ik7sI:d] перевищувати
facilitate [fE7silE6teit] полегшувати, сприяти
fasten [7fasEn] прикріплювати, скріпляти, прив'язувати
hook [7huk] крюк, зачіпка, скоба

lever [7live] важіль, рукоятка

nose leg передня стійка

nose wheels [wi:l] передні колеса

pin [7pin] штифт, шип, цапфа

pivot [7pivEt] вісь, штифт, блок, поворотна цапфа

port [pO:rt] лівий

provided [prE7vaidid] за умові, якщо

resort [ri:7zO:t] звертатися до, звертатися за допомогою

secure [si7kjuE] міцно укріпити, прикріпити

shackle [7SXkEl] хомутик, сполучна скоба

shock strut [strVt] амортизаційна стійка

starboard [7sta:bEd] правий

tow [7tEu] буксирувати

towing bar [7tEuiNba:r] буксировочне водило

truck [7trVk] машина

wing tip закінцівка крила

TEXTS FOR SUPPLEMENTARY READING

MAINTENANCE OF ENGINE

General

adjust [E7djust] регулювати

air blow-off valve клапан перепуску повітря

air inlet duct вхідний повітропровід

cotter pin шплінт

cover чохол

defect [di7fect] дефект, несправність

detect [di7tekt] виявити

elimination [i6limi7neiSEn] усунення

exhaust duct вихлопна труба

foreign objects [7fOrin 7Obd3ekt] сторонні предмети

locking wire [waiE] контровочний дріт

maintenance service ремонтні роботи

quality [kwOliti] якість

routine [ru7ti:n] встановлений

tightly [taitli] щільно

tool kit сумка з інструментами

FAULT CONDITIONS

ageing [7eid3iN] старіння

apparatus [XpE7reits] прилад, апаратура

associated with [E7sEuSieitid] поєднаний з

circuit [7sE:kit] ланцюг

current [7kVrEnt] струм

fault [fO:lt] відмова

frequently [7frikwEnt] часто

indication [6indi7keiSEn] показання

intermittent [intE7mitEnt] переривчастий, уривчастий

lie [7lai] лежати

locate a diagnose визначати діагноз

maladjustment [7mXlEd3VstmEnt] неправильне (невірне) регулювання

random [7rXndEm] випадковий

recorder реєструючий прилад

reveal виявляти

roughly [7rVfli] грубо

sensitivity [sensi7tiviti] чутливість

tedious [7ti:djEs] нудний, виснажливий

time-consuming [7taimkEn7sju:niN] такий, що віднімає(забирає) багато часу

tracing [treisiN] простежування, запис

transistor [trXn7zistE] транзистор

voltage [7voultid3] напруга

INTERMITTENT FAULTS

accelerate [Ek7selEreit] прискорювати

baffling [7bXfliN] відхил, відхилення

breakdown [7breikdaun] поломка

cardboard картон

chassis [7SXsi] рама

copper [7kOpE] мідь, мідний

crack [7krXk] тріщина

damaged пошкоджений

deposit [di7pOzit] давати осад

disruption руйнування

doubt [7daut] сумнів

face [7feis] стикатися, зіткатися

flexing [7fleksiN] кривизна

inception [in7sepSEn] початок

instrumentation обладнання

lead [7li:d] вести, проводити

loose [7lu:s] не натягнутий

minute [mai7nju:t] найдрібніший

obvious [7ObviEs] явний, очевидний

offer [7OfO] пропонувати

plug [7plVg] вилка

printed circuit друкована схема

recur [ri7kE] повторюватися

remove [ri7mu:v] усувати, ліквідувати

service engineer інженер з технічного обслуговування
(service) bench пульт, верстат
socket [7sOkit] розетка, патрон
soldered [7sOldEd] припаяний
solution [sE7lu:SEn] рішення
strip смуга, стрічка, руйнування
switch перемикач
worst [7wE:st] найгірший

METHODS OF SERVICING

accuracy [7XkjurEsi] точність
adequate [7Xdikwit] відповідний
advantage [Ed7vantid3] перевага
AM – amplitude modulation амплітудна модуляція
calibration [6kXli7breiSn] калібрування, тарування
capacitance bridge міст для вимірювання ємкості
essential [i7senSEl] важливий
FM – frequency modulation частотна модуляція
generator [7d3enereitE] генератор
inductance [in7dVktEns] індуктивність
installation [6instE7leiSEn] установка
manufacturer [6mXnju7fXktSErE] виробник
multi-purpose багатоцільовий
oscillas cope [7OsileitEs koup] осцилятор
overhaul [7ouvEhO:l] капітальний ремонт
pulse/sine wave generator генератор гармонійних коливань
purchase [7pE:tSEs] придбати, купувати, набувати
suit [7sju:t] підходити
test gear [7giE] тестова апаратура (приладдя)
test meter [7mi:tE] тестер
universal [6ju:nivE:sEl] універсальний

NEW COATING TECHNIQUES

adverse [7XdvEs] несприятливий
ceramic [si7rXmik] керамічний
comparatively [kEm7pXritivili] порівняно
corrosion-protection film протикорозійна захисна плівка
dense [7dens] твердий, щільний
deposition [6depE7ziSEn] відкладення
flame coating [koutiN] полум’яне напилення
high-temperature високотемпературний
intrinsic власний
oxide [7EksEid] окис

plasma coating	плазмове напилення
technique [tek7ni:k]	метод, спосіб, техніка
tungsten [7tVNstEn]	вольфрам
velocity [vi7lOsiti]	швидкість

DEFINED SURFACE CONDITION

abrasion	абразивний знос (абразивне зношення)
chemical separation [7kemikEl sepE7reiSEn]	хімічне виділення
corrosion [kE7rEu3En]	корозія
counter [7kauntE]	протистояти, опиратися
employ [im7plOi]	застосовувати
erosion [i7rEu3En]	ерозія
layer [7leiE]	покриття, плівка, шар
manufacturing [7mXnju7fXktS(E)riN]	обробка, виготовлення, виробництво
property [7prEpEti]	властивість
stress [stres]	навантаження
techniques [tek7niks]	технологічне обладнання (оснащення), техніка, метод, технологія
thermic injection [7QE:mik in7d3ekSn]	термічна інжекція

LOGICAL FAULT FINDING

a.c. – alternating current [7O:ltEitiN 7rVrEnt]	змінний струм
anode	анод
cathode [7kXQoud]	катод
circuit diagram [7sE:rit]	комутаційна схема
circuitry [7sE:kitri]	електрична або електронна (схема)
collector vottage [kE7lektE]	напруга колектора, колекторна напруга
d. c. – direct current	постійний струм
drip	крапля, потьоки
emitter [i7mitE]	емітер транзистора
fault [7fO:lt]	відмова
frequency [7fri:kwEns]	частота
generalized	загальний, узагальнений, універсальний
grid	сітка
inject [in7d3ekt]	вприскувати
test gear [7giE]	контрольно-випробувальна апаратура; тестер
locate [lou7keit]	виявити, знайти

oscilloscope [o7silE6skEup] осцилоскоп

overheating [ouvE7hi:tiN] перегрів

plug in [7plVg] вмикати

reading [ri:diN] показання

resolve [ri7zEulv] дозволяти

reveal [ri7vi:l] виявляти

servo-motor сервомеханізм

short circuit коротке замикання

terminal [7tE:minEl] клема

warm up [wO:m] прогрівати

wax віск, парафін

FLAW-DETECTOR FOR FASTENER HOLES

analyze [7XnElaiz] аналізувати

audible [6O:dEbl] чутний

crack [7krXk] тріщина

depth [dept] глибина

detect виявляти

drill свердлити

fastener hole затискаючий отвір

flaw [7flO:] вада, дефект

flaw detector дефектоскоп

motorized моторизований

print-out штампована

probe [7prEub] зонд, датчик, щуп

revolve [ri7vOlv] обертати(ся)

scanning такий, що сканує, розгортає

sensitivity [7sensi7tiviti] чутливість

signal [7signl] сигналізувати

tone тон

whereabouts [7wBErEbauts] місцезнаходження

SPARES

capacitor [kE7pXsitE] конденсатор

chart [7tSa:t] схема, таблиця

electrolytic [i7lektrEulaitik] електролітичний

fail [7feil] відмовляти

item [7aitEm] окрема річ

major [7meid3E] головний

resistor [ri7zistE] опірник (резистор)

spare [7spBE] запасна частина

stock [7stOk]	запас, інвентар
subassembly	складальний вузол
valve [7vXlv]	клапан, електронна лампа

SPECIAL TOOLS FOR AVIATION WORK

gear puller [giE7pulE]	виштовхувач шасі; знімач
handle [7hXnd]	держак, рукоятка; керувати, регулювати
maintenance [7meintenEns]	ремонт, технічне обслуговування
pliers [7plaiEz]	кусачки, плоскогубці, щипці
screw driver	викрутка
socket wrench	торцевий гайковий ключ
tool [7tul]	інструмент
tool chest [7tSest]	ящик для інструментів
torgue wrenche [tOk 7rentS]	тарований гайковий ключ
wrench [rentS]	накидний гайковий ключ

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