МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
УКРАЇНСЬКА ДЕРЖАВНА ЛЬОТНА АКАДЕМІЯ

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Посібник призначений для здобувачів вищої освіти ступеня «Бакалавр» другого року навчання за спеціальністю J6 «Авіаційний транспорт» освітньо-професійної програми «Технічне обслуговування та ремонт повітряних суден і двигунів».

Посібник містить 14 тематичних розділів, що охоплюють достатній обсяг професійно орієнтованої лексики. Матеріал доповнено системою вправ, текстами для самостійного опрацювання із завданнями до професійно спрямованих аудіоматеріалів, а також тематичними тестами для контролю знань.

Aviation English: Manual / [Compilers: Tsarova L.V., Martynenko N.O., Cherniavska O.O.] – Kropyvnytskyi: USFA, 2025. – 73 p.

The manual is intended for the second year Bachelor's degree students of specialty J6 "Aviation Transport" under the educational and professional program "Maintenance and Repair of Aircraft and Engines."

The manual contains 14 thematic units with a sufficient scope of professionally oriented vocabulary. The material is supplemented with a system of exercises, texts for independent study with tasks based on professionally focused audio materials, as well as thematic tests for knowledge assessment.

Розглянуто НМРА (протокол №5 від 28.05.2025 р.) та на засіданні кафедри професійної та авіаційної мовної підготовки УДЛА (протокол №10 від 21.05.2025 р.) та рекомендовано для видання використання в освітньому процесі.

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MODULE 1 Aircraft maintenance (Part 1)

Unit 1

MAINTENANCE OF AN AIRCRAFT

Warming up. *Describe what you see in the picture.*

Exercise 1 *Read the text.*

The Airworthiness Limitations are approved by European Aviation Safety Agency (EASA) in accordance with the applicable certification procedures and the type certification basis. This specifies the maximum intervals for replacement and/or maintenance requirements of aircraft components, systems and structures determined by life limits and/or requiring monitoring during scheduled maintenance. The following airworthiness limitations and requirements are separated into groups as described below: A. Maintenance limitations Checks of components and systems that are required to be performed during scheduled maintenance. B. Replacement limitations. List of time limits at which aircraft manufacturer considers that specific components must be replaced. C. Structural limitations of the aircraft structures based on calculations and tests approved by the EASA.

Maintenance limitations are the scheduled maintenance requirements, replacement limitations that include list of items with time limits for the exchange of the aircraft certain

parts, also list of items with time limits for the overhaul of the aircraft certain parts, structural limitations (the life of the aircraft structures)

Recommended intervals for items inspection are based on normal usage under average environmental conditions. All inspection intervals for scheduled maintenance checks, replacement and overhaul schedule and special inspections schedule are based on average usage and average environmental conditions. Aircrafts operated in abnormal environments (i.e. tropic, humid or cold climates, i.e. dusty and salt-water environment, etc.) may be worn, corroded, etc. more. Operation in abnormal environments can influence inspections, overhauls, lubrication, etc. frequency. In these areas, periodic inspections should be performed in shortened inspection periods based on operator's experiences.

Same as an annual condition inspection, except the interval of inspection is 100 h of operation instead of 12 calendar months. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation. The time from the date on the original airworthiness certificate issued with each new aircraft, to be used as the basis for determination of all maintenance or replacement intervals. Condition inspection is for, but not limited to, cleanliness, cracks, deformation, corrosion, wear, and loose or missing fasteners. Corrosion pitting, or a surface breakdown of a material due to chemical or electro-chemical attack by atmosphere, moisture or other agents is also checked.

FLIGHT TIME / FLIGHT HOURS is the time in service from the moment the aircraft leaves the ground until it touches the ground at the end of the flight. FUNCTIONAL INSPECTION is a quantitative inspection to determine if one or more functions of an item performs within specified limits. The function inspection is a comparative examination of a system or an item against specific standard. HEAVY MAINTENANCE is any maintenance, inspection, repair, or alteration a manufacturer has designated that requires specialized training, equipment, or facilities.

The purpose of operational inspection is to determine that a system or an item is operable. This inspection requires no special equipment. The operational inspection is comparable to the inspection performed out by the flight crew. The purpose of the operational inspection is to determine that an item is fulfilling its intended purpose. It does not require quantitative tolerances. This is a failure finding task. Overhaul maintenance, inspection, repair, or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacturer of the product.

SCHEDULED MAINTENANCE. Preventative maintenance tasks scheduled to be accomplished at specified intervals. SPECIAL INSPECTION. lnspection of components or systems based on calendar time, hours or cycles which does not coincide with the scheduled inspection. UNSCHEDULED MAINTENANCE. Inspections and checks for damage after operating the aircraft in conditions which could require unscheduled maintenance, i.e. hard landing, etc. VISUAL INSPECTION. An observation to determine that item is fulfilling its intended purpose. Visual inspection criteria can be accomplished without disassembly or removal of adjacent equipment. It does not require quantitative tolerances. This is a failure finding task. WEAR Material or part consumed as a result of exposure to operation or usage.

Exercise 2 *Answer the questions:*

1. What are the Airworthiness Limitations approved by?
2. What are maintenance limitations?
3. What are Recommended intervals for items inspection based on?
4. How long and how often is an annual condition inspection?
5. Describe FUNCTIONAL INSPECTION?
6. What is the purpose of the operational inspection?
7. Without what can visual inspection criteria be accomplished?

Exercise 3 *Complete the sentences with the words in the box.*

aircraft	***Certification***	***airworthiness***	***aviation***	***standards***	***civil***

In _____, airworthiness is the measure of an aircraft's suitability for safe flight. Initial airworthiness is demonstrated by a certificate of airworthiness issued by the civil aviation authority in the state in which the aircraft is registered, and continuing airworthiness is achieved by performing the required maintenance actions.

_____is based on standards applied by civil aviation authorities. Interoperability is served when national benchmarks adopt _____from international civil and military organizations such as International Civil Aviation Organization (ICAO), European Aviation Safety Agency (EASA), NATO and European Defence Agency (EDA).

In the U.S., Title 14, Code of Federal Regulations, Subchapter F, Part 91.7 states: "a) No person may operate an _____unless it is in an airworthy condition. b) The pilot in command of a _____aircraft is responsible for determining whether that aircraft is in condition for safe flight. The pilot in command shall discontinue the flight when unairworthy mechanical, electrical, or structural conditions occur which compromise the_____."

Exercise 4 *Make 5 questions to the text.*

In the regulation (UE) nº216/2008, common rules in the aviation sector are established and created the European Aviation Safety Agency. Article 5 of this regulation details the first specifications about airworthiness. Article 20 is about airworthy certification.[2]

The main objective of these rules are to establish and to maintain a high and uniform security level at the civil aviation in Europe. For that reason, it lays down different rules according to the airworthiness:

- The jets will accomplish the essential established requirements in annex I in airworthy section.
- It will be proved that the products possess a type certificate. Moreover, it is necessary to include modifications certificate of the same jet. This should be included in

supplementary type certificate. Both of them may be sold when an applicant proves that their product achieves the regulations' basis.

- No airplane can be operated without a valid certificate of airworthiness (C of A)
- A certificate of airworthiness will be issued when the applicant has demonstrated that the aircraft is conformed to the design of the model approved in its type certificate and that the pertinent documentation, inspections and tests confirm that the aircraft is in a condition for safe use. The certificate of airworthiness shall be valid as long as it is not canceled, or annulled, or is left without effect, provided that the aircraft is kept in accordance with the essential requirements for maintenance of airworthiness.
- The Commission will ensure, in particular, because the current state of the art and best practices in airworthiness are reflected; keep in mind the experience accumulated in service by aircraft throughout the world, as well as scientific and technical progress; allow immediate response, once the causes of accidents and serious incidents are determined; do not impose requirements on aircraft that are incompatible with the obligations assumed by the Member States by virtue of their belonging of the International Civil Aviation Organization (ICAO).

Exercise 5 *Complete the sentences with the words in the box.*

being fact only that the ~~thing~~ was what

1. One ___*thing*_____ I admire about Jimi is that he never complains about anything.

2. _____ I found most disappointing was their complete lack of enthusiasm.

3. _____thing that upsets me most is people being cruel to animals.

4.What I love about your cooking is the _____ that you experiment with exotic ingredients.

5.The _____ things we didn't see were the art gallery and the science museum.

6. What I like about swimming is _____ able to spend some time on my own.

7. The thing I liked most about the show _____ the song at the end.

8.What upset me was _____ you didn't mention your plans to me.

Exercise 6 *Complete the sentences with the correct form of the verb in brackets.*

1. We ____*had been walking*_____ (walk) around the town for hours so we were pleased to have a rest.

2.It wasn't clear how long the children _____ (hide) in the woods.

3. My brother got here yesterday morning but my sister _____ (arrive) until last night.

4. By the time the police arrived, most of the demonstrators _____ (leave) already.
5. When she realised I _____ (look) at her, she waved at me.

6. Jason hadn't been working very hard, so I'm not surprised he _____ (get) fired from his job.
7. We _____ (have) our dinner when Jacob arrived, so we asked him to join us.

8. They _____ (never / be) on a plane before and it was the first time they'd travelled abroad.

Exercise 7 *Put the words in the correct order to make sentences.*

1 _____ an / Take / you / umbrella / it / going / because / rain / is / with / to.
Take an umbrella with you because it is going to rain.
2 _____ DJ / going / Jack / is / to / the / at / party / Saturday / be / on / the.
_____
3 _____they / going / to / to / Are / Mexico / next / move / year?
_____
4 _____ 're / to / have / You / a / great / going / time!
_____
5 _____tomorrow / 's / to / work / going / from / Julia / home.
_____
6 _____ take / going / the / We / bus / 're / to / home.
_____
7 _____ to / Luise / see / Are / at / the / going / you / weekend?
_____
8 to / to / the / not / go / swimming pool / I / because / 'm / I / have / going / a cold.
_____

Exercise 8 *Complete the sentences. Use the positive or negative past simple form of the verbs in the box.*

~~go~~	***sit***	***come***	***have***	***not write***	***not eat***	***not become***	***not drive***

1 _____ They *went* to the beach every day when they were on holiday.
2 He _____a car. He took the bus or walked.
3 I_____a lot of friends when I was at school.
4 Dino was an actor. He_____a doctor, like his father.
5 They_____on the sofa and waited for the manager.
6 She _____this email. I know who did.
7 We_____to this restaurant last year, on my birthday. It was the same table, too!
8 I _____the cake because I didn't like it.

Exercise 9 *Complete the questions using the words in brackets.*

1 _____*Did we go* to Italy last year or the year before? (we/go)
2 _____ a good time at the party? (they/have)
3 _____with her Polish friends when she was in Warsaw? (she/stay)
4 _____ Almodovar's new film last week? (you/see)
5 _____ to his grandmother in Spanish? (he/speak)
6 _____ their weekend holiday? (they/like)
7 _____ a coffee break at 11am? (you/have)
8 _____ at all last summer? (it/rain)

Exercise 10 *Write the sentences in the past tense.*

1 You know the answer to all the questions.
You knew the answer to that question.
2 He doesn't go to the city centre at the weekend. _____ last weekend.
3 Our house has a very big kitchen now. _____ small kitchen when we moved in.
4 The children don't usually break things._____ the vase.
5 Elsa meets her friends for a coffee every Tuesday. _____ last Tuesday.
6 We don't think about work all the time. _____ last Sunday.
7 I often see Mark at the gym. _____ on Monday.
8 She doesn't take the train every day. _____ yesterday.

Exercise 11 *Watch the following video:* https://youtu.be/TrSVUZNAi4Y

Exercise 11-A *Tick those kinds of maintenance that were mentioned in the video:*

- A Check
- Overhaul
- Line check
- C Check
- Regular check

Exercise 12 *Answer the following question:*

1. Who develops Aircraft Maintenance programmes?
2. What intervals of checks were mentioned?
3. What is Never exceed period?
4. How can it be counted?
5. What is the synonym to pre-flight check?
6. What are the identifiers used for different types of checks?
7. What is the pre-flight check aimed at?

8. Where the different types of check can be conducted?
9. Why “D” Check must be planned in advance?

Exercise 13 *Match the types of checks with their descriptions.*

1	“B” check	A	Executed regularly at the ramp, every day or a few times a day depending on a kind of flight Checks airframe and engine defects
2	Pre-flight	B	Executed every 500-800 hours Checks airframe and engine May be done overnight on the ramp or in hangar
3	“A” check	C	Performed every 6-9 months Detailed check of systems
4	“D” check	D	Performed every 15-24 months or at the specific amount of actual flying hours Most of the aircraft is inspected
5	“C” check	E	Occurs every 5-6 years Checks the entire aircraft and takes up to 2 months

Exercise 14 *Match the words from the video with their definitions.*

	Operator		Flights conducted on short distances
	Operational status		Transit check, or executed before the flight
	Pre-flight check		Apron
	Never exceed period		The period after which the aircraft loses its airworthiness
	Ramp		An inspection executed by sight
	Short-haul		The working condition of an aircraft
	Visual inspection		Done according to some timetable and after certain period s of time
	Scheduled		The airline that uses the aircraft

Exercise 15 *Complete the sentences with the words from exercise 5.*

1. It is usually the _____ who develops the Aircraft Maintenance programme.
2. ___ is executed before every flight or its every leg.
3. _____ checks are usually weekly, monthly etc.
4. The operators plan "D" check in advance in order not to miss _____.
5. Pre-flight check is usually performed on the _____
6. Every kind of check starts with _____
7. The aircraft conducting ____ flights may have more actual flying hours than those conducting long-haul flight.

Unit 2

PREFLIGHT MAINTENANCE

Warming up. *Describe what you see in the picture.*

Exercise 1 *Read the text.*

Operational and Functional Check Interval (flight hours) Initials: First 25 hr. 100 hr./ Annual/ Special

1. Check aileron, elevator and rudder controls for full range of travel, excessive friction and obstructions.
2. Check the roll and pitch trim for full range of travel and indication.
3. Check extension, retraction and locking of wing flaps at all positions.
4. Check the full range of engine controls for motion, obstruction and excessive friction.
5. Set the altimeters to correct barometric pressure setting and check if indicate within 50 feet of field elevation.
6. Check the vertical speed indicators to indicate zero.
7. Check the radio communication capability.
8. Check the landing and anti-collision/strobe lights operation.
9. Start and warm the engine according to POH (Chapter 4).
10. Move the fuel selector to the LEFT and RIGHT positions to verify fuel flow.
11. Perform the brake test.
12. Perform ignition and engine ground test according to POH (Chapter 4).
13. Shut down the engine according to POH (Chapter 4).
14. Perform a walk around to detect any fluid leaks or other abnormalities. Check the fuel leak in the cockpit.

PERIODIC INSPECTIONS Finishing Works Interval (flight hours) Initials: First 25 hr. 100 hr./ Annual/ Special 1. Install upper engine cowling. Close and check all covers are on their place. X X 2. Check the removal of all detected defects. X X 3. Fill out the required logbook entries.

TIME LIMITS The inspections described herein constitute what the aircraft manufacturer considers necessary to ensure the continued airworthiness of WT9 Dynamic LSA aircraft. 1. INTRODUCTION The inspection program is based on the number of

flight hours, operating hours of engine and calendar time. The method for recording flight hours and operating hours of engine remains consistent throughout the life of the aircraft. The owner or operator must record the number of flight hours, operating hours of engine and time of operation used for purpose of complying with inspection intervals. 2. INSPECTION INTERVALS The aircraft manufacturer's inspection program has been developed to enable an owner to accomplish requested inspections and maintenance with Civil Aviation Authorities regulations. lf two inspection requirements are given for one inspection item, the limit that is reached first must be applied.

The following inspection intervals at which the items are to be inspected on normal usage under average environmental conditions.

A. 25-hour inspection for the new aircraft, the special inspection must be performed at first 25 flight hours.

B. 100-hour inspection Complete inspection of aircraft must be performed each 100 flight hours. At the aircraft with less than 100 flight hours flown per year an annual inspection must be performed.

C. Annual inspection Complete inspection of aircraft must be performed each 12 calendar months. The inspection items to be covered in the annual inspection are identical to the 100-hour inspection items.

D. Special inspection intervals for special inspections specified in other intervals than 100-hour or annual, the inspection of aircraft's part or system must be performed each prescribed interval. E. Unscheduled maintenance checks Abnormal aircraft operations require special maintenance checks.

Example: If 100-hour inspection is scheduled, it must be accomplished anytime between 90 and 110 hours. The next 100-hour inspection must be accomplished anytime between 190 and 210 hours, etc. Each inspection interval can be exceeded by allowed tolerances or can be performed early at any time prior to the regular interval as provided bellow: • ln the event of compliance of any inspection scheduled, that occurs within inspection tolerances, the next phase due point remains as originally set • ln the event of early compliance of any inspection scheduled, that occurs more ahead than inspection tolerances of schedule, the next phase due point must be rescheduled to establish a new due point from the time of early accomplishment • ln the event of late compliance of any inspection scheduled, the next inspection in sequence retains a due point from the time to the late inspection was originally scheduled. NOTE Inspection intervals and tolerances specified by the original equipment manufacturers, Airworthiness Directives, etc. take precedence over inspection intervals and tolerances authorized by aircraft manufacturer.

Exercise 2 *Answer the questions:*

1. What are the initial operational and functional check intervals for the aircraft described in the text?
2. How is the functionality of wing flaps verified during the operational and functional check intervals?
3. What is the procedure for setting and verifying the altimeters during the operational check?

4. How are the vertical speed indicators checked during the operational check?
5. Which communication capability is verified during the operational check of the aircraft?
6. What exterior lights are tested during the operational check of the aircraft?
7. What is the procedure for starting and warming the engine during the operational check?
8. How is the fuel flow verified during the operational check of the aircraft?
9. Describe the procedure for performing the brake test during the operational check.
10. What tests are conducted during the ignition and engine ground test, as per the manufacturer's instructions?
11. How is the engine shut down according to the manufacturer's instructions during the operational check?
12. What is the purpose of performing a walk around inspection after the operational check, and what abnormalities are checked for?
13. What actions are included in the finishing works interval after the operational check?
14. How are defects detected during the operational check addressed during the finishing works interval?
15. What logbook entries are required to be filled out after completing the operational check?
16. How are inspection intervals determined in the aircraft manufacturer's inspection program?
17. What are the inspection intervals for the new aircraft as specified in the text?
18. How are inspection intervals adjusted for aircraft with abnormal operations or those exceeding tolerances?

Exercise 3 *Complete the sentences with the words in the box.*

aircraft's	**airworthiness**	**series**	**essential**	**identify**

Preflight maintenance refers to the _____of checks and procedures conducted on an aircraft before it takes off for a flight. These checks are _____ for ensuring the safety and _____ of the aircraft. Preflight maintenance typically includes visual inspections, system checks, and verification of essential components to _____ any potential issues or discrepancies that could affect the _____ performance during flight. Preflight maintenance is typically conducted by trained maintenance personnel or pilots themselves, depending on the size and complexity of the aircraft. It is a crucial step in the flight preparation process and helps to mitigate the risk of in-flight emergencies or accidents due to mechanical failures.

Exercise 4 *Make 5 questions to the text.*

«17-year-old student pilot safely lands plane after losing wheel on solo flight»

Maggie Taraska, 17: "I panicked a little bit, but I followed my training. On her first solo cross country flight, wheel fell off her plane. Instructor talked her thru safe landing. Taraska spoke a day after the incident, and mentioned how frightening the situation was. "I was scared and stressed out," Taraska said. "Obviously, if you listen to my conversation with the tower, you can hear that pretty clearly."

In her conversation with the tower, Taraska was asked if she was flying solo, and she replied with the fact that she was both a student pilot and by herself. "It was very serious and could have been much worse," Beverly Airport manager Gloria Bouillon said. "You know, she was pretty shaken up." "What she pulled off was pretty incredible" Beverly airport manager says 17-year-old student pilot was able to safely land her plane after losing its right main wheel after takeoff! She was only person on board - no injuries!

Bouillon said Taraska was emotional after learning she'd need to make an emergency landing with just two of three wheels. "She was up there until we were fairly safe and certain that she was ready to land," Bouillon said. Taraska's father Walter said his daughter did an incredible job as he held his breath and watched the landing at the airport. "By the time I saw Maggie coming on her approach, it was a better approach I could have flown," Walter Taraska said. "And I got more hours than she does."

Bouillon said the plane had plenty of fuel for the pilot to circle around for about half an hour until she was calm enough to land. "There were personnel talking her through this, her instructor as we were working the ground crew, and the emergency response as far as staging and what runway we were going to have her land on," Bouillon said. Piper PA-28 lost its main right landing gear wheel on departure. Student pilot on a solo flight. After orbiting for an hour she landed safely at Beverly Airport north of Boston.

Bouillon praised Taraska's instructor for the job done on the ground to coach her through the landing over the radio. In the end, a team effort had a happy ending, with no injuries in the incident. "What she pulled off was pretty incredible," Bouillon said. "Typically landing without one wheel is certainly one you don't expect to walk away from."

Exercise 5 *Choose the correct alternative.*

1 The sports club has put up the prices again. ~~I'll cancel~~ / I'm going to cancel my membership.

2 I've talked to my boss, but he's very unhelpful and won't do / isn't going to do anything about the problem.

3 I'll go / I'm going to go into town this afternoon. Can I get you anything?

4 Will you hold / Are you going to hold this box for a moment while I open the car?

5 I hear the government's announced they'll raise / they're going to raise taxes again.

6 My car won't start / isn't going to start. It must be the cold.

7 I'll start / I'm going to start a new job next week.

8 I'm so sorry I forgot your birthday. Why don't you come round tomorrow evening and I'll cook / I'm going to cook you a meal?

9 I took these trousers back to the shop, but they won't change / aren't going to change them without a receipt.

10 You look tired. Shall we eat / Are we going to eat early this evening?

11 John's sold his car. He'll buy / He's going to buy a bike, he says.
12 I've decided what to do for my holiday. I'll go / I'm going to go to Morocco.

Exercise 6 *Write sentences with going to and the words in brackets.*

1 It's Noah's birthday next week. (send him a card) *I'm going to send him a card.*
2 Look at those dark clouds. (rain very soon) _____
3 John forgot his Mum's birthday. (be in trouble) _____
4 This room is a mess. (who / help me tidy up?) _____
5 Alex and Tony can't afford to stay in a hotel. (buy a tent) _____
6 This food is terrible. (not come to this restaurant again) _____
7 I need to get more exercise. (walk to work from now on) _____
8 I'm very tired this morning. (have another coffee) _____
9 We haven't got enough money for the bus. (how / get home?) _____
10 I need to leave home very early tomorrow. (buy petrol tonight) _____
11 My parents dislike flying. (travel to Prague by train) _____
12 Leila's phone isn't working. (contact her?) _____

Exercise 7 *Choose the correct alternative*.

Last week I visited the remote country village where I grew up, in a region now popular with tourists. I remembered the two old-fashioned shops and a number of old houses in the hills. I realised very quickly that although in (1) *many / ~~few~~* ways it appears unchanged, in reality hardly (2) *nothing / anything* is the same. (3) *All / Every* the traditional houses are there, of course, and (4) *both / most* the shops. But (5) *none of the / none of* houses are owned by residents. All of (6) *they / them* belong to city people, who arrive (7) *every weekend / all the weekends* in their noisy new cars. (8) *Neither of / Neither* the shops sells local goods these days; they have expensive foreign food chosen by (9) *somebody / anyone* in an office (10) *anywhere / somewhere* who has (11) *little / a little* knowledge of the region. There are (12) *few / a few* new houses too, and they have (13) *no / none* of local character. You can see the same style (14) anywhere / somewhere in Europe. In fact, (15) *the whole / whole* atmosphere of the village has changed so much that it is (16) *any / no* more interesting than any suburban street.

Exercise 8 *Complete the email with suitable verbs in the correct form: present simple, present continuous, past simple or past continuous.*

Hi Anita,
Thanks for the text you (1) *sent* yesterday. I (2) _____ to feel better now although my back still (3) _____ if I (4) _____ too far. Last night I (5) _____ some friends who (6) _____ dinner near here. I (7) _____ to the cafe quite easily, but while I (8) _____ home, my back (9) _____ to ache really badly. So today I (10) _____ more careful. Remember that great song we heard during Laura's birthday meal? Well, I finally (11) _____ to find out who sings it! They have a concert next month

if you (12) _____ to go together? You could invite John too – I know you (13) _____for a thank-you gift for him. I must lie down now because my back (14) _____to hurt again. Come and see me soon. I'm OK, but you know me, I (15) _____bored very quickly!

Love, Alice

Unit 3

POSTFLIGHT INSPECTION

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

The postflight inspection refers to the series of checks and procedures conducted on an aircraft after it has completed a flight. These checks are essential for ensuring the continued airworthiness of the aircraft and identifying any issues that may have arisen during the flight. Postflight inspections typically include visual inspections, system checks, and verification of essential components to assess the aircraft's condition and identify any maintenance or repair needs.

Here are some common tasks involved in a postflight inspection:

1. Visual inspection of the exterior of the aircraft to check for any signs of damage, wear, or fluid leaks.
2. Inspection of the engine and propeller for any signs of overheating, vibration, or mechanical issues.
3. Examination of the landing gear, tires, and brakes to ensure they are functioning correctly and free from defects.
4. Testing of critical systems such as the electrical, hydraulic, and avionics systems to verify proper operation.
5. Verification of fuel levels and consumption to ensure that the aircraft has enough fuel for the next flight.
6. Review of flight data and performance indicators to assess the aircraft's performance during the flight.
7. Inspection of the cockpit and cabin to ensure that all controls, instruments, and equipment are in proper working condition.
8. Documentation of any discrepancies or issues discovered during the inspection and reporting them to maintenance personnel for further evaluation and repair if necessary.

Postflight inspections are typically conducted by trained maintenance personnel or pilots themselves, depending on the size and complexity of the aircraft. They are an essential part of the overall maintenance and safety protocols for aircraft operations, helping to identify and address any potential issues before they escalate into more significant problems.

Exercise 2 *Answer the questions:*

1. What is the purpose of a postflight inspection?
2. What are some common tasks involved in a postflight inspection?
3. Why is a visual inspection of the aircraft's exterior important during a postflight inspection?
4. How are the engine and propeller inspected during a postflight inspection?
5. What components of the landing gear are checked during a postflight inspection?
6. Why is it necessary to test critical systems such as electrical, hydraulic, and avionics systems during a postflight inspection?
7. What is the significance of verifying fuel levels and consumption after a flight?
8. How is flight data used during a postflight inspection?
9. What areas of the cockpit and cabin are inspected during a postflight inspection?
10. Why is it important to document any discrepancies or issues found during a postflight inspection?

Exercise 3 *Complete the sentences with the words in the box.*

standard	***the inspection***	***personnel***	***size***	***serious***	***safety***

Recording any discrepancies or problems found during _____ and notifying maintenance staff for additional assessment and potential repair is _____ procedure. These inspections, crucial for aircraft safety and maintenance, are usually carried out by skilled maintenance _____ or the pilots themselves, contingent upon the aircraft's _____ and intricacy. They play a fundamental role in ensuring the overall maintenance and _____ standards of aircraft operations by pinpointing and resolving any potential issues before they develop into more _____ concerns.

Exercise 4 *Make 10 questions to the text.*

The snake was found tangled in the landing gear Friday, Feb. 9, as Petty Officer 2nd Class Cole Lindvall was doing a post-flight inspection of the MH60 helicopter. Photo Petty Officer 2nd Class Cole Lindvall.

Rescues are what the U.S. Coast Guard does best and in Florida, that apparently includes pulling strange wildlife out of embarrassing predicaments. That's the only way to describe the baffling scene when a snake trespassed on government property and got knotted up in an $850 million piece of equipment. "This unexpected stowaway was found napping on a Jayhawk tailwheel," U.S. Coast Guard Station Clearwater wrote in a Feb. 11 Facebook post. "He reluctantly departed the scene when confronted."

The intruder was discovered Feb. 9, as Petty Officer 2nd Class Cole Lindvall was doing a post-flight inspection of the MH60 helicopter, officials said. Lindvall is not a fan of snakes and admits he jumped back in surprise. "The snake was removed fairly quickly by another crew member on duty who wasn't afraid of snakes," station officials told McClatchy News. "It was released into the grass away from the hangar." The snake was identified as a two-foot corn snake, a species native to Florida. They can reach four feet in length and also go by the names chicken snake and red ratsnake, experts say. Lindvall's photo of the reptile wrapped in the landing gear had more than 1,500 reactions and comments on Facebook as of Feb. 13.

Many offered jokes, while some speculated on the possibilities. "So they can fall from the airplane into you?" Endil Gamas posted. "Wait for the news report: flying snake crashes through couples roof," Ken Marlow wrote. "Imagine that wrapped around your leg right after take off," Kelly Gilroy said. Clearwater is just west of Tampa.

Exercise 5 *Put the verbs into the correct form: present perfect simple or present perfect continuous.*

1 John's terribly upset. *He's broken off (he / break off)* his engagement to Megan. Apparently *she's been seeing (she / see)* someone else while *he's been (he / be)* in Africa.

2 Could you translate this Arabic song for me? I understood Arabic when I was a child, but _____ (I / forget) it all.

3 What's that mark on the side of the car? _____(you / have) an accident?

4 The lock on this case is broken. _____ (you / play about) with it?

5 Your Portuguese is very good. _____ (you / study) it long?

6 Of course you don't know what I think! _____ (you / never / ask) my opinion.

7 I'm not surprised _____ (he / fail) the exam.
_____ (he / not / work) hard recently.

8 Mina's hands are very dirty. _____(she / repair) her bike.

9 I'm going to make some lunch for the kids. _____(they / swim) all morning. I'm sure they're hungry.

10 _____ (I / do) grammar exercises all morning. I deserve a break.

11 Where's my phone? This is the third time _____ (I / lose) it today!

12 Oh, do be quiet. _____(you / grumble) all weekend!

13 Since Maria won that talent show _____ (she / spend) money like there's no tomorrow.

_____(she / buy) a new car and (she / move) to a big new house.

_____(she / throw) wonderful parties at her new house every weekend too. In fact, I'm going to one tomorrow.

Exercise 6 *Use your own ideas to complete the sentences. Use the present perfect simple, the present perfect continuous or the past simple.*

1 Since we bought this car, *we've done lots of trips round the country*.
or *we've been doing lots of trips round the country*.
2 *My colleague was ill, so I had to work overtime* _____last week.
3 _____for several years.
4 _____since yesterday.
5 When I was a child_____.
6 _____five minutes ago.
7 It's three weeks since_____.
8 For the past three weeks_____.
9 _____in 2016.
10 _____since I came into this room.
11 Last December_____.
12 _____since I got up this morning.

Exercise 4 *Complete the sentences with the verbs from the box in the correct form: present perfect or past simple.*

~~be~~	be	break	earn	forget	give	go
have	offer	phone	tell	train		

1 Ben *has been* off work all this week.

2 Gina _____to the cinema every weekend when she was a student.

3 Pippa_____ very quiet recently. Is she OK?

4 Eric _____every day for six months before he ran the marathon.

5 How long _____Nick _____his current job?

6 _____Tina_____ her parents since she left home?

7 Ow, that hurt! I _____think I my toe.

8 Jack _____me about his problems last night.

9 I _____Sue's address. Do you have it?

10 Jane_____ more money in her last job, but she enjoys this one more.

11 Mark _____you his phone number before he left?

12 My brother _____to lend me his car tomorrow, so I needn't get the bus.

Exercise 4 *Complete the following sentences with the appropriate word in bold.*

1. *action / activity*

We decided to take immediate ..... when we realized there was a problem. The environmental changes in the area are the result of human ..... .

2. *advice / advise*

Can you ..... me on the best course of action to take? He offered me some excellent ..... .

3. *affect / effect*

Diverting the course of the river will have a major ..... on the local ecosystem. Frequent traffic jams in the suburbs seriously ..... journey times into the city.

4. *alternative / alternate*

If our teachers are ill and have to take a day off work, the college usually does its best to make ..... arrangements. During the vacation, the college doctor is only on site on ..... days (Monday, Wednesday, and Friday).

5. *appreciable / appreciative*

Widening the road made an ..... difference to the flow of traffic. The applause at the end of the concert was warm and ..... .

6. *assumption / presumption*

They raised taxes on the ..... that it would help control spending. It's sheer ..... for the government to suggest things have improved since they came to power.

7. *avoid / prevent*

Rapid international action managed to ..... an environmental disaster from taking place. There are areas in the city that are wise to ..... visiting after dark.

8. *beside / besides*

The office is just ..... the bus station. ..... their regular daytime job, many people do extra work in the evening.

9. *briefly / shortly*

..... before the earthquake began, many animals were seen to be behaving in an unusual manner. She spoke ..... but passionately about the need to help those in developing countries.

10. *canal / channel*

A ..... system joined the two main rivers, which made transporting goods much quicker. When television first became popular in the early 1950s, most viewers only had access to one .....

11. ***complimentary / complementary***

In western societies, acupuncture and hypnosis are seen as ..... medicines. All new students will receive a ..... study pack and dictionary.

12. ***conscientious / conscious***

Most people are ..... of the need to protect the environment. ..... workers should be rewarded for their hard work.

13. ***continual / continuous***

The computer system has given us ..... problems ever since we installed it. Some days it works, other days it doesn't. The ..... noise from the new freeway has forced many people to move.

14. ***control / inspect***

New teachers often find it difficult to ..... their classes. Environmental health inspectors regularly ..... commercial kitchens for cleanliness, especially those in restaurants.

Unit 4

FUEL SERVICING

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

"FUEL SERVICING aircraft" refers to the activity or process of refueling aircraft with aviation fuel. This task involves transferring fuel from storage tanks or fuel trucks into the fuel tanks of an aircraft, ensuring that it has an adequate supply of fuel for its intended flight operations. Fuel servicing is a critical aspect of aircraft maintenance and operations, as it directly impacts the safety, performance, and efficiency of the aircraft. It is typically conducted by trained ground crew or personnel at airports using specialized equipment and procedures to minimize the risk of fuel spills or other hazards.

At all stages of flight, the flight crew must be vigilant regarding their fuel state and, to the maximum extent possible, adhere to Company policies and fly the planned profile. The following, based on phase of flight, is offered as guidance for appropriate in-flight fuel management:

- Is the fuel on board the aircraft sufficient for flight?
- Has the requested amount of fuel actually been loaded on the aircraft?
- Has the uplift been verified (fuel on board minus fuel remaining from the previous leg should equal the fuel loaded)?
- If there is a fuel uplift discrepancy, it must be reconciled before flight as a discrepancy could indicate a fuel gauge error.
- Are ground services (power and airconditioning) available or is an early APU start required? If an early APU start is necessary, has that fuel burn been considered in the total fuel requirements.
- Are there known departure delays that could result in utilizing more than the fuel amount planned for ground operations?

- Is de-icing required? If de-icing is done at a remote location or as an 'engines running" profile, has the additional fuel been accounted for as part of the total consumption on the flight plan?
- Is the final payload greater than the planned load? If so, additional fuel may be required.
- Has the aircraft been loaded properly? In most aircraft, a forward Centre of Mass will result in a higher fuel burn.
- How long/far is the pushback procedure? If there is a significant time involved in the push, engine start should be delayed until close to or reaching the tug disconnection position to conserve fuel.
- Does Company policy allow for taxi with less than all engines running?

Exercise 2 *Answer the questions:*

1. What is the purpose of fuel servicing aircraft?
2. What type of fuel is typically used for aviation purposes?
3. What are the safety precautions involved in fuel servicing aircraft?
4. How is aviation fuel stored and transported to airports?
5. What are the different methods used for refueling aircraft?
6. What are some factors that influence the amount of fuel required for a flight?
7. How is the quality of aviation fuel ensured during the refueling process?
8. What are the potential risks associated with improper fuel servicing of aircraft?
9. How is fuel consumption monitored during flight operations?
10. What are some environmental considerations related to fuel servicing aircraft?

Exercise 3 *Complete the sentences with the words in the box.*

color	***system***	***over-the-wing***	***kerosene***	***servicing***	***types***
		wing			

There are two main types of fuel for _____ an aircraft, gasoline or AVGAS (aviation gasoline) and the JET fuel or simply known as kerosene. These depend on the type of propulsion _____ of the aircraft.

In piston engine or reciprocating engine, the AVGAS is used and has different grades and they are identified by color code. The servicing piping band must match the _____ of the fuel.

The fuel to power a turbine has _____ and in some cases a mixture with AVGAS. These types of fuel are mainly used in turbojets, turboprops for planes and turboshaft engines for helicopters. Three _____ of turbine fuel in aviation are JET A and JET A-1, and JP is another designation for military aircraft application. The color of the jet fuel is straw or colorless.

Smaller aircraft are refueled by the _____ method; it uses fuel hoses to fill the tank by the ports on the top of the wing. The other type for larger aircraft, the ports are located on the _____ bottom in the leading edge of the wing.

Exercise 4 *Make 5 questions to the text.*

It is important to check the entire system for potential wear and tear damages that aircraft fuel systems get with the passage of time. Make sure that all the units and parts are functional and attached properly. Check the valves and drain plugs of the system. Make sure to look out for gathered contamination.

Similarly, the filter and sump should also be checked for sediment, water, or dirt particles. If booster pumps are installed, the system should also be checked for leaks by operating the pumps to make sure they are functional.

Over time, your fuel system can become contaminated with sediments, oil, and dirt particles. For maintenance, it is required that you do a proper inspection of the fuel system to clean the entire system and get rid of contamination.

Keeping a fuel system clean begins with awareness of the types of pollutants: Water, solid particles, dirt, and metal particles are also common. However, other factors can also contribute to the contamination.

An aircraft fuel tank should be inspected for corrosion and possible leaks. Check the fittings and connections for leaks or failures. Some fuel tank manufacturers use strong materials which ensure the longevity of the tank.

Perform thorough inspection to look out for contamination, leaks, tank damages, and piping deteriorations.

Make sure that the lines are correctly connected and are well-supported. Look out for screws, nuts, and clamps that are loose. To tighten clamps, use a hose-clamp torque wrench. If the clamps do not tighten properly, replace the clamps, the hose, or both.

The external surface of the hose may develop cracks, usually short in length, which primarily result from surface aging. Loosened hoses, little cracks, and valve damages often become the causes of system breakdown. If not given proper maintenance service, your fuel system may fail long before its service life ends.

Inspect the sector valves for free operation, excessive backlash, and accurate pointer indication. If the backlash is redundant, check the whole mechanism for joints, loose pins, and broken drive lugs. Repair or replace the defective parts and inspect the cable control systems for worn or frayed cables.

Do a proper inspection of the booster pumps and look out for proper operation, leaks & condition of fuel, electrical connections, and motor brushes. Make sure that the drain lines are running free of bends or restrictions. Also, check the vent and drain lines.

Exercise 5 *Obligation and option - Complete the sentences with a suitable word from the box. More than one answer is possible in some cases.*

alternative compelled compulsory essential exempt forced have liable mandatory must need obligation obliged optional require voluntary

1. A valid passport and visa are ..... by all visitors to the country. Unless you have these, you will not be allowed in.

2. Attendance at all classes is ..... You may not miss a lesson without prior arrangement with your course leader.

3. Note to new students: all fees ..... be paid no later than one week before the commencement of the course. Your place on the course may be forfeited if you fail to satisfy this requirement.

4. Before you make an appointment with the college doctor, you ..... to register your name at the clinic, which you will find in the Administrative Block.

5. If you cause any damage to property, whether accidentally or on purpose, you will be held ..... for any costs incurred.

6. The college was ..... to refund part of its student fees after they announced that several of the course modules would no longer be running.

7. Books, clothes, and food are currently ..... from government tax, as they are considered necessities rather than luxuries.

8. ..... police security checks are carried out on all students and members of staff who will be working or associating with minors (i.e., those under 18).

9. Entrance to the museum is free, but visitors are asked to make a ..... donation of $5.

10. Evening lectures and presentations are .....: it is up to you whether you attend or not.

11. Unless your attendance improves, the college will have no ..... but to ask you to leave the course.

12. Manufacturers of packaged foods are ..... to list all the ingredients contained clearly on the box or package. This should include any artificial colorings and additives.

13. You are under no ..... to work overtime, but we hope that you would be prepared to work late at least once a week.

14. When Professor Ranscombe was accused of making sexist remarks in his lectures, he felt ..... to write a public letter of apology to those he had offended.

Exercise 6 *In the following sentences, choose the correct verb in bold to complete the phrasal verb in italics. The meaning of each phrasal verb you need is given in brackets at the end of each sentence.*

1. Some parents are criticized for the way they bring / make / throw up their children. *(to raise children)* 2. They refused to move / face / come up to their responsibilities, with disastrous consequences. *(to accept an unpleasant state of affairs, and try to deal with it)*

3. The President decided to shout / cry / call off his visit to Europe. *(to not to go ahead with a plan)*

4. It is only at election time that Senators add / count / read on support from their constituents. *(to rely / depend on other people)*

5. Many developing countries are failing to run / chase / catch up with their more developed neighbors. *(to get to the same level*)

6. It can take months or even years for political scandals to die / cut / fall down. *(to become less strong)* 7. An alarming number of students jump / drop / fall out of school early every year. *(to leave a race, a competition, a course of study, etc., early or before you have finished)*

8. Major international companies can't carry / cut / figure out the popularity of the anti-capitalist movement. *(informal: to find it hard to understand)*

9. The committee members dropped / made / fell out over plans for the new health center. *(to argue)* 10. If they examined the issues more closely, they would search / look / find out the reasons. *(to discover)*

11. As we grow / stand / look up our priorities change. *(to change from being children to being adults)* 12. Salaries very rarely catch / keep / work up with the cost of living. *(to rise at the same speed as something else)*

13. The problem with the survey is that it leaves / keeps / throws out the real reasons for current demographic shifts. *(to not include)*

14. The journalist showed / pointed / spoke out the mistakes made by the agency over the last few years. *(to show)*

Exercise 7 *Change the adjective in bold in each of these sentences to a noun so that the word is grammatically correct in the sentence. The first one has been done for you.*

1 Items of ***valuable*** can be left in the safe at reception. value

2 Money cannot make up for bad ***tasteful*** and bad manners. .....

3 Do you have a ***thirsty*** for knowledge? Then why not enroll on one of our evening college courses? .....

4 It is often said that '***honest*** is the best policy'. .....

5 It can often be lack of ***confident*** that prevents a student from maximizing his or her potential. .....

6 Many people heading off to college for the first time are often unaware of the ***expensive*** involved in simple day-to-day life. .....

7 Student discounts are offered on most products and services on our Web site, although some ***restricted*** apply. .....

8 There were a few ***similar*** between the Boeing 727 and the Tupolev 154 airliners, but these were mainly cosmetic. .....

9 The Director of Studies is unable to say with any ***certain*** when the new changes will be implemented. .....

10 Unnecessary ***absent*** from work is costing American companies millions of dollars a year. .....

11 Please complete the form and return it at your earliest ***convenient***. .....

12 The student union has questioned the necessary of CCTV in the library, but the management insists it is ***necessary*** in order to reduce petty theft. .....

13 Despite a ***relaxed*** of regulations, many feel that they are under too much pressure to conform to a set of outdated rules. .....

14 Sometimes in business, rules have to be changed according to needs: ***flexible*** is the key to success. .....

Unit 5

OIL SERVICING

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

Changing engine oil and lubrication is a very crucial part in maintaining an engine's health. With the right oil, friction losses in an engine can be reduced to a minimum. In addition to this, the main purpose of changing the oil is to remove harmful contaminants.

Lubrication can play an important role in the lifespan of an engine. During the maintenance of an aircraft engine, oil changes happen very often. Certain types of lubricants are recommended for this purpose.

A professional aircraft pilot should have a basic understanding of engine oils and lubricants. Unlike vehicles, the oil system in aircraft is very reliable and demands very little maintenance regarding oil changes and filter inspections. Nevertheless, the pilot should always keep an account of the plane's engine health and oil changes.

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All those harmful substances that get mixed in with the engine's oils get collected at the filter. During the operation, the air filter gets dirt from the atmosphere and pollutes the engine. A filter can only block particles of a certain size, no filter can remove 100% of unwanted substances. It’s a good practice to change the filter every time you change the oil.

After cleaning out the old oil, refill the oil again. To minimize potential problems, the choice of lubricants must be suitable for the engine.

Moreover, keep in mind that there are reserves of additives in new oil which get used once the engine starts running, which have their effects.

Exercise 2 *Answer the questions:*

1. Why is changing engine oil and lubrication considered crucial for maintaining engine health?
2. How does the right oil help reduce friction losses in an engine?
3. What is the main purpose of changing engine oil?
4. How does lubrication impact the lifespan of an engine?
5. Why do oil changes happen very often during the maintenance of an aircraft engine?
6. What is the recommended frequency for changing an aircraft engine's oil filter?
7. Why is it important for a professional aircraft pilot to understand engine oils and lubricants?
8. What role does the oil filter play in maintaining engine health?
9. What are some potential consequences of not changing an aircraft engine's oil and filter regularly?
10. What should be considered when choosing lubricants for an aircraft engine?

Exercise 3 *Complete the sentences with the words in the box.*

intervals	***oil***	***filter***	***industry***	***oil***

The primary purpose of an _____ change is to get rid of the harmful substances that get mixed with the oil. There are different suggested time _____ for an oil change. It’s better to get the information regarding your specific model from an _____ professional. However, an interval of 25 hours for an oil change and 50 hours for a _____ change is considered standard for most aircraft.

Consequently, engines that operate in dirty or dusty environments and have high _____ consumption due to high blow-by should have more frequent oil changes.

Exercise 4 *Make 5 questions to the text.*

Aircraft engines are designed with two levels of oil filtration. The first level is a pickup screen in the oil sump. This is a coarse screen designed to prevent relatively large pieces from making their way into the oil pump and possibly damaging it. If the pieces are

big enough to have part numbers on them or serve as souvenirs, the pickup screen should keep them in the sump and out of the lubrication system. This is why it's critical to remove and inspect the oil pickup screen at every oil change. This is a relatively simple task on Lycoming engines, but many Continental engines do not have a removable suction screen. Therefore, during oil changes, Continental recommends straining waste oil through a 1000-micron (approximately 0.040-inch) mesh screen as the oil flows out of the sump drain and into the waste bucket (you can purchase the recommended strainer screen. Regardless of whether you are inspecting a Lycoming built-in suction screen or examining debris caught in the external strainer per Continental, if you find metal at this stage, you need to address it before further flight.

Following the oil pump, the oil flows into the second stage of filtration: the oil screen or filter. Many aircraft engines were originally designed with fine metal mesh oil screens limited to 25 hours between oil changes. However, oil filtration technology evolved away from oil screens well before most of us were born. The gold standard for decades now has been the spin-on oil filter. Oil filters provide many benefits, including better filtration and the ability to increase oil change intervals to 50 hours.

Exercise 5 *Modal verbs - Use your own ideas to complete the sentences.*

1 In most countries motorcyclists must *wear a helmet* .
2 I nearly missed the first class this morning. I should have _____.
3 I decided I didn't like the shoes I'd bought, but luckily I was able to_____ .
4 The shops are always terribly crowded on Saturdays, so I may _____.
5 Politicians ought not to _____ .
6 Some people dislike flying, so they might _____.
7 Most people pass their driving test first time, so it can't _____.
8 I don't know why my brother hasn't phoned. He may have _____.
9 If you really want to get fit, you should _____.
10 When the price of petrol rose sharply, many people had to_____ .
11 Can you imagine travelling before the invention of railways? It must have ____.
12 Commuter trains are often overcrowded, and people aren't able to _____.
13 I could when I was ten, but I couldn't _____.
14 That girl looks as if she's lost. We'd better _____.

Exercise 6 *Write questions using if for the following answers.*

1 *What would you do if someone gave* _____I'd probably give it to my mother.
you a diamond necklace ?
2 _____I'd share it with my friends.
_____?
3 _____ I'd call the police.
_____?
4 _____We'd get out as fast as we could.
_____?
5 _____I'd ask my teacher's advice about it.

_____?
6 _____He'd be extremely angry.
_____?
7 _____She'd probably fall over.
_____?
8_____ I'd be late for work.
_____?
9 _____We'd sail around the world.
_____ ?
10 _____They'd never make any money.
_____?
11 _____There'd be no more wars.
_____?
12 _____I'd stay at home all day.
_____?

Exercise 7 *Complete the second sentence so that it has a similar meaning to the first sentence. Do not use by unless it is important to the meaning.*

1 The instructor has marked all the assignments.
All the assignments *have been marked*.
2 My hairdresser kept me waiting for half an hour.
I _____.
3 The students must pay their own fees for this course.
The fees for this course _____.
4 Do you suppose your brother could have sent that text?
Do you suppose that text _____?
5 Solar panels supply all the power for this house.
All the power for this house _____.
6 During the summer, the cafe was employing more waiters every week.
During the summer, more waiters _____.
7 Nobody informed the police that there had been a mistake.
The police _____.
8 Where will your company post you next year?
Where will you _____?
9 The news about the war worried Josephine.
Josephine _____.
10 I've still got the money because no one has claimed it.
I've still got the money because it _____.
11 Has anyone ever asked you for your opinion?
Have you _____?
12 People shouldn't allow children to watch that kind of TV programme.
Children _____.
13 All visitors must wear identity badges.
Identity badges _____.

14 Someone must have changed the time of the meeting.
The time of the meeting _____.

MODULE 2 Aircraft maintenance (Part 2)

Unit 6

HYDRAULIC SYSTEM CHARGING

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

A hydraulic system uses a fluid under pressure to drive machinery or move mechanical components.

Virtually all aircraft make use of some hydraulically powered components. In light, general aviation aircraft, this use might be limited to providing pressure to activate the wheel brakes. In larger and more complex aeroplanes, the use of hydraulically powered components is much more common. Depending upon the aircraft concerned, a single hydraulic system, or two or more hydraulic systems working together, might be used to power any or all of the following components:

- wheel brakes
- nose wheel steering
- landing gear retraction/extension
- flaps and slats
- thrust reversers
- spoilers/speed brakes
- flight control surfaces
- cargo doors/loading ramps
- windshield wipers
- propeller pitch control

A hydraulic system consists of the hydraulic fluid plus three major mechanical components. Those components are the "pressure generator" or hydraulic pump, the hydraulically powered "motor" which powers the component concerned and the system "plumbing" which contains and channels the fluid throughout the aircraft as required.

Fluid is the medium via which a hydraulic system transmits its energy and, theoretically, practically any fluid could be utilized. However, given the operating pressure

(3000 to 5000 psi) that most aircraft hydraulic systems generate in combination with the environmental conditions and strict safety criteria under which the system must operate, the hydraulic fluid that is used should have the following properties:

- **High Flash Point.** In the event of a hydraulic leak, fluid ignition should not occur at the normal operating temperatures of the surrounding components. Special hydraulic fluids with fire resistant properties have been developed for aviation use. These fluids are phosphate esters and, unlike mineral oil based hydraulic fluids, they are very difficult to ignite at room temperature. However, if the fluid is heated to temperatures in excess of 180 degrees C, it will sustain combustion. The auto-ignition temperature of most aviation hydraulic fluids is in the range of 475 degrees C.
- **Adequate Viscosity.** Aircraft hydraulic systems must work efficiently over a broad temperature spectrum. The fluid used must flow easily at very low temperatures but must also maintain adequate viscosity at high temperatures. The ideal hydraulic fluid will have a very low freezing point and a very high boiling point.
- **Lubricant Properties.** The hydraulic fluid acts as a lubricant for the pumps, actuators and motors within the system. The fluid should have anti-corrosion properties and be thermally stable.
- **Thermal Capacity/Conductivity.** Hydraulic fluid acts as a system coolant. The fluid must be able to readily absorb and release heat.

Exercise 2 *Answer the questions:*

1. What is the primary function of a hydraulic system in aircraft?
2. What are some examples of components in aircraft that are typically powered by hydraulics?
3. What are the three major mechanical components of a hydraulic system?
4. Why is it important for hydraulic fluid to have a high flash point in aircraft systems?
5. What special properties do aviation hydraulic fluids have compared to other hydraulic fluids?
6. What temperature range must hydraulic fluid be able to withstand in aircraft systems?
7. Why is it essential for hydraulic fluid to have adequate viscosity in aircraft systems?
8. How does hydraulic fluid contribute to the lubrication of components in a hydraulic system?
9. What role does hydraulic fluid play in regulating the temperature of a hydraulic system?
10. What are some safety considerations when selecting hydraulic fluid for use in aircraft systems?

Exercise 3 *Complete the sentences with the words in the box.*

pressurize	***type***	***fluid***	***pumps***	***pressure***	***increasing***

Several types of hydraulic _____ driven by a variety of power sources can be found in aviation applications. Pumps include:

- **Gear Pumps.** Gear pumps use meshing gears to pump fluid. Gear pumps are fixed displacement _____ pumps as they move a specific amount of _____ per rotation. Gear pumps may be used on low _____ systems (under 1500 psi) but are generally not suitable for high pressure applications
- **Fixed Displacement Piston Pumps.** Piston pumps utilize a piston moving in a cylinder to _____ a fluid. A fixed displacement pump moves a specific amount of fluid with each stroke.
- **Variable Displacement Piston Pumps.** This is the most common type of pump on large aircraft. The variable displacement design allows the pump to compensate for changes in the system demand by _____ or decreasing the fluid output. This allows near constant system pressure to be maintained.

Exercise 4 *Make 5 questions to the text.*

Several types of hydraulic pumps driven by a variety of power sources can be found in aviation applications. Pumps include:

- **Gear Pumps.** Gear pumps use meshing gears to pump fluid. Gear pumps are fixed displacement type pumps as they move a specific amount of fluid per rotation. Gear pumps may be used on low pressure systems (under 1500 psi) but are generally not suitable for high pressure applications
- **Fixed Displacement Piston Pumps.** Piston pumps utilize a piston moving in a cylinder to pressurize a fluid. A fixed displacement pump moves a specific amount of fluid with each stroke.
- **Variable Displacement Piston Pumps.** This is the most common type of pump on large aircraft. The variable displacement design allows the pump to compensate for changes in the system demand by increasing or decreasing the fluid output. This allows near constant system pressure to be maintained.

Exercise 5 *Reported speech and questions - Complete the sentences with the correct form of* ***say*** *or* ***tell****.*

1 *Did you tell* (you) your brother the truth about that money?

2 What _____(you) to Wendy last night? She looks terribly upset this morning.

3 Is something wrong? Can you _____me about it?

4 My English teacher keeps asking me _____the class a joke from my country, but I can't think of any suitable ones!

5 If I asked you to marry me, what _____(you)?

6 I never know what _____to people when they pay me a compliment.

7 Don't worry, I'm sure the boys are fine. Anyway, I _______them to call me if they had any problems.

8 I'll never speak to him again after all the lies he _____me last weekend.

9 If I were you, I _____(not) anything about your problems now.

10 Promise you _____(not) anything to my girlfriend. She'll be furious if she finds out what I've done.

11 I _____(already) you, I don't know where your phone is.

12 Please _____you'll forgive me. I'm really sorry for all the trouble I've caused.

13 I'm ready to serve the meal. Can you _____the children to go and wash their hands, please?

Exercise 6 *Put in at, for, during, by, until or in.*

The city of London was founded by the Romans (1) *in* the year 43 CE. (2) *During* the next few years it quickly became the main trading centre in Britain. (3) _____two hundred years after the Romans left, the city was almost forgotten. The full importance of the city of London did not return (4) _____the eleventh century. (5) _____the end of that century, the government of England was based in Westminster and the Tower of London had been started. (6) _____the Middle Ages London continued to grow and (7) _____the time of Shakespeare, it had become a prosperous capital city with many fine buildings. Unfortunately, most of these buildings were made of wood and (8) _____1666 they were almost all destroyed by a fire which lasted (9) _____several days. The Great Fire of London was a real tragedy for the people living there (10) _____ that time, but it is true that many of the areas which are most attractive today were planned (11) _____the rebuilding which followed.

Exercise 7 *Put in a/an or the.*

Tina wants to buy a car. She has come to see Ryan, who is trying to sell his.

Tina: So, you don't say much in your advert. Is this (1) ***an*** old car?

Ryan: Not very old. Come and have a look at it.

Tina: Were you (2) _____ first owner?

Ryan: No, I got it two years ago.

Tina: Have you driven it a lot?

Ryan: Well, I drive to my office in (3) _____city centre five days (4) _____week, but I don't use it much at weekends.

Tina: I see. Now, the thing is, I'm (5) _____doctor. I've just started work at (6) _____hospital in Hills Road. I'm on call a lot of the time and I have to find (7) _____car which is really reliable. (8) _____car I used to have was always breaking down and giving me problems.

Ryan: Oh, this one's very good. It may not be (9) _____fastest car around, but it always gets there eventually. And it's got (10) _____new set of tyres.

Tina: Right. It's good to know that. Can I go for (11) _____test drive?

Ryan: Um, actually, that's not possible right now. tina: Why not?

Ryan: Well, I'm afraid it won't start. You see, I've just realised that (12) _____battery is flat.

Unit 7

FLIGHT CONTROL SYSTEM MAINTENENCE

Warming up *Describe what you see in the picture.*

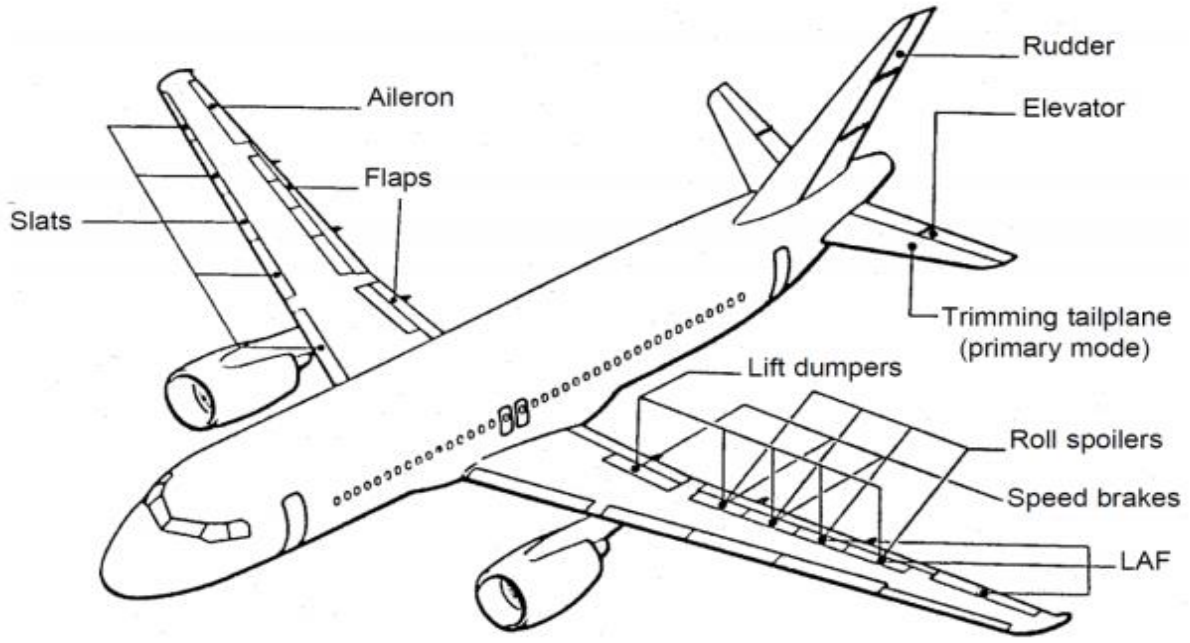

Diagram A – Aircraft Flight Control Systems

Exercise 1 *Read the text.*

This chapter focuses on the flight control systems a pilot uses to control the forces of flight and the aircraft's direction and attitude. It should be noted that flight control systems and characteristics can vary greatly depending on the type of aircraft flown. The most basic flight control system designs are mechanical and date back to early aircraft. They operate with a collection of mechanical parts, such as rods, cables, pulleys, and sometimes chains to transmit the forces of the flight deck controls to the control surfaces. Mechanical flight control systems are still used today in small general and sport category aircraft where the aerodynamic forces are not excessive.

Aircraft flight control systems consist of primary and secondary systems. The ailerons, elevator (or stabilator), and rudder constitute the primary control system and are required to control an aircraft safely during flight. Wing flaps, leading edge devices, spoilers, and trim systems constitute the secondary control system and improve the performance characteristics of the airplane or relieve the pilot of excessive control forces. Primary Flight Controls Aircraft control systems are carefully designed to provide adequate responsiveness to control inputs while allowing a natural feel. At low airspeeds, the controls usually feel soft and sluggish, and the aircraft responds slowly to control applications. At higher airspeeds, the controls become increasingly firm and aircraft response is more rapid. Movement of any of the three primary flight control surfaces

(ailerons, elevator or stabilator, or rudder), changes the airflow and pressure distribution over and around the airfoil. These changes affect the lift and drag produced by the airfoil/ control surface combination, and allow a pilot to control the aircraft about its three axes of rotation. Design features limit the amount of deflection of flight control surfaces. For example, control-stop mechanisms may be incorporated into the flight control linkages, or movement of the control column and/or rudder pedals may be limited. The purpose of these design limits is to prevent the pilot from inadvertently overcontrolling and overstressing the aircraft during normal maneuvers. A properly designed aircraft is stable and easily controlled during normal maneuvering. Control surface inputs cause movement about the three axes of rotation. The types of stability an aircraft exhibits also relate to the three axes of rotation.

Exercise 2 *Answer the questions:*

1. What are the two main categories of flight control systems discussed in the chapter?
2. Describe the primary control system components of an aircraft.
3. How do secondary control systems enhance aircraft performance?
4. What are the design considerations for aircraft control systems to ensure adequate responsiveness?
5. How do aircraft control systems vary in responsiveness at different airspeeds?
6. What effect does the movement of primary flight control surfaces have on airflow and pressure distribution over an airfoil?
7. How are design features used to limit the deflection of flight control surfaces?
8. What is the purpose of control-stop mechanisms in flight control linkages?
9. How does a properly designed aircraft exhibit stability and control during maneuvers?
10. How do control surface inputs affect movement about the three axes of rotation in an aircraft?

Exercise 3 *Complete the sentences with the words in the box.*

roll	***deflect***	***control***	***trailing***	***right***	***aircraft***	***increased***

Ailerons control _____ about the longitudinal axis. The ailerons are attached to the outboard _____ edge of each wing and move in the opposite direction from each other. Ailerons are connected by cables, bellcranks, pulleys, and/or push-pull tubes to a control wheel or _____ stick. Moving the control wheel, or control stick, to the right causes the right aileron to deflect upward and the left aileron to _____ downward. The upward deflection of the right aileron decreases the camber resulting in decreased lift on the _____ wing. The corresponding downward deflection of the left aileron increases the camber resulting in _____ lift on the left wing. Thus, the increased lift on the left wing and the decreased lift on the right wing causes the _____ to roll to the right.

Exercise 4 *Make 5 questions to the text.*

Adverse Yaw Since the downward deflected aileron produces more lift as evidenced by the wing raising, it also produces more drag. This added drag causes the wing to slow down slightly. This results in the aircraft yawing toward the wing which had experienced an increase in lift (and drag). From the pilot's perspective, the yaw is opposite the direction of the bank. The adverse yaw is a result of differential drag and the slight difference in the velocity of the left and right wings. Adverse yaw becomes more pronounced at low airspeeds.

At these slower airspeeds, aerodynamic pressure on control surfaces are low, and larger control inputs are required to effectively maneuver the aircraft. As a result, the increase in aileron deflection causes an increase in adverse yaw. The yaw is especially evident in aircraft with long wing spans. Application of the rudder is used to counteract adverse yaw. The amount of rudder control required is greatest at low airspeeds, high angles of attack, and with large aileron deflections. Like all control surfaces at lower airspeeds, the vertical stabilizer/rudder becomes less effective and magnifies the control problems associated with adverse yaw. All turns are coordinated by use of ailerons, rudder, and elevator.

Exercise 5 *Complete the texts. Put one word in each gap.*

Alexander Carpenter works *1 in* sales, and he's a regional manager. He *2* _____the north-west region and he's 3 _____ for a small team of five other sales people. His job 4 _____ a lot of travelling within the region, and he's in contact with his team on a day-to- 5 _____ basis. It's not a nine-to-6 _____job: Alexander has to do a lot of 7 _____. Fortunately he can 8 a lot more money by doing this, and his working 9 _____are quite good. After income 10 _____he makes £60,000 11 _____year. Recently his wife had a baby, but the company gave him extra time 12 _____to be with her after the birth. Kelly Bradbury is a financial adviser for a bank. She specialises in mortgages, which means that she 13 _____ people who want to buy a flat or a house. At the moment Kelly spends a lot of her time 14 _____with young people who are trying to buy a property for the first time, which is not easy. She works 15 _____hours – 9 am to 5 pm – and she doesn't have to 16 _____overtime.

Exercise 6 *Fill in the gaps with the correct form of the verbs in brackets.*

1 I'm busy right now. *I'm filling in* (fill in) an application form for a new job.

2 My tutor _____(see) me for a tutorial every Monday at two o'clock.

3 John _____(not/study) very hard at the moment. I _____(not/think) he'll pass his exams.

4 'What _____(he/do)?' 'He _____(try) to fix the television aerial.'

5 Animals _____(breathe in) oxygen and _____(give out) carbon dioxide.

6 Be quiet! I _____(want) to hear the news.

7 In my country we _____(drive) on the right-hand side of the road.

8 My friend Joe's parents _____(travel) round the world this summer, and probably won't be back for a couple of months.

9 The college _____(run) the same course every year.

10 Numbers of wild butterflies _____(fall) as a result of changes in farming methods.

Exercise 7 *Fill in the gaps in this model answer with verbs from the box in the past simple.*

allow be be be invent increase
lay mean own receive replace ride take walk

The pace of change in the world of technology is amazing. It *1* *wasn't* (not) long ago that the postal service *2* _____our only way to communicate over any distance It *3* _____days and sometimes weeks to receive letters from within the same country. As a result, the news in the letters *4* _____already out of date when people *5* _____them. In the workplace, this *6* _____that business was mostly conducted locally, over relatively short distances. When Alexander Graham Bell *7* _____the telephone in 1876 it *8* _____the foundation for the communication systems we have today. The telephone *9* _____two people to communicate instantly across a great distance. Eventually computers *10* _____typewriters and dramatically *11* _____the speed of our daily work life Nowadays the Internet is an essential part of every business. However, it is not just communications that have changed. Only 50 years ago most people *12* _____(not) a can People *13* _____to work or *14* _____bicycles. Changes in travel as well as the increased speed of communications have led to the global business world that we have today.

Unit 8

HYDRAULIC MAINTENANCE

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

When properly maintained and operated, hydraulic GSE equipment should provide many years of trouble free service. This article is a supplement to the OEM maintenance manual provided with the equipment. Proper operation should be according to the OEM manual. Longer equipment life, less frequent unscheduled maintenance, and lowest life cycle cost are three good reasons to properly maintain hydraulic GSE equipment. GSE equipment that hydraulically interfaces with the aircraft, if not properly maintained, could contaminate the aircraft hydraulic system and damage sensitive hydraulic aircraft components. All hydraulic systems require regular maintenance; some only call for checking fluid level and seal integrity.

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Chemical: Incompatible fluids entering the hydraulic system, cleaning solvent residue not removed during component maintenance, or chemical reaction with components (hose material, plated component, elastomer material). Thermal damage,

excessive mechanical shear, and additive deterioration are other examples. - viscosity variance, fluid additive breakdown.

Prevention

The best offense is a good defense - prevent contaminants from entering the system. Make sure the fluid filler cap is in proper operating condition, and only is removed for servicing the reservoir. Change filters often enough to maintain the required contamination level of the system (or annually as a minimum, more frequently depending on usage). Ensure that the air filter/desiccant is not saturated which could either limit air from exchanging with the reservoir, or allow contaminates to enter the reservoir.

Exercise 2 *Answer the questions:*

1. What are the benefits of properly maintaining hydraulic Ground Support Equipment (GSE)?
2. How can improperly maintained hydraulic GSE equipment potentially damage aircraft hydraulic systems?
3. What are some examples of chemical factors that can affect hydraulic systems?
4. How can viscosity variance impact hydraulic system performance?
5. What is the significance of changing filters regularly in hydraulic systems?
6. How frequently should filters be changed to maintain the required contamination level of a hydraulic system?
7. What role does the fluid filler cap play in preventing contaminants from entering the hydraulic system?
8. Why is it important to ensure that the air filter/desiccant is not saturated in hydraulic GSE equipment?
9. What are some best practices for preventing contaminants from entering the hydraulic system?
10. How can regular maintenance contribute to extending the lifespan of hydraulic GSE equipment?

Exercise 3 *Complete the sentences with the words in the box.*

air	***sealed***	***fluid***	***fluid***	***excessive***	***deterioration***

Fluid reservoirs should be a sealed type with an _____ filter and desiccant to control the condition of the _____ inside the reservoir system. Consider adding an air filter and desiccant system to the reservoir. This can be accomplished by replacing the breather type filler cap with a flange adapter and a replaceable filter and desiccant element. Other external systems can be added if this is not convenient, then a _____ filler cap is required to limit the exchange of air only through the air filter and desiccant system.

Regular fluid monitoring assures that the fluid meets the required specifications of the fluid, airframe, or component manufacture (initial baseline, 25 hours operation in an indoor facility, more frequently for outdoor or harsh environments) This can be done by

taking a _____ sample (using ANSI/NFPA T2.9.11-1999) and sending to an analysis laboratory, or using a portable contamination monitor. Required testing intervals can be adjusted according to individual results and rate of fluid contamination _____ . Monitoring allows you to adjust maintenance programs to keep contamination levels at an acceptable level without _____ costs.

Exercise 4 *Make 5 questions to the text.*

Fluid Compatibility and Associated Problems

With so many fluids used in an aircraft today, extra care must be exercised to keep all the fluids isolated. Petroleum based and phosphate ester hydraulic fluids, engine oils, and anti-icing fluids all require different wetted materials in hydraulic GSE equipment. The same servicing equipment must never be used for more than one fluid type and a fluid type placard should be attached to all units.

If a unit does become contaminated with a foreign fluid, great care must be exercised to assure that all affected components are replaced, or thoroughly cleaned and dried prior to installation. The fluid in question should be properly disposed of, and an ICP spectrometric fluid analysis should be done to assure that all traces of the foreign fluid has been removed from the system. In many cases, this cost will exceed purchasing a new piece of equipment.

Proper GSE maintenance involves knowing the condition of the fluid and components, keeping the unit's contamination level at an acceptable value, and operating the unit properly all in accordance with the OEM manual to ensure a long, trouble free life.

Exercise 5 *Fill in the gaps with the past simple or past continuous form of the verbs in brackets. In which gaps could you use used to?*

I *1* *had* (have) a wonderful biology teacher, Mrs Hughes. She *2* _____(make) us excited about the subject because she was so interested herself. I remember one lesson in particular; we *3* _____(study) different types of plants, and Mrs Hughes *4* _____(describe) the different parts of the flower. She *5* _____(pick up) a purple flower, I can't remember exactly what it was, and then suddenly we *6* _____(notice) that she *7* _____(cry)! She 8 _____(apologize) and *9* _____(say) that sometimes nature was so beautiful it just made her cry! We *10* _____(not/know) what to do at first, but it certainly *11* _____(make) us think. Something similar *12* _____(happen) while she *13* _____(show) us how to work the microscope. She *14* _____(examine) a slide of some plant tissue and she *15* _____(smile) all over her face. She suddenly *16* _____(get) all excited and *17* _____(say), 'Isn't it wonderful?' Some students *18* _____(laugh) at her when she *19* _____(not/look) but I didn't. Somehow her enthusiasm *20* _____(inspire) me, and I *21* _____(start) to like biology.

Exercise 6 *Fill in the gaps with the past simple, past perfect simple or past perfect continuous of the verbs in brackets.*

Last year my friends *arranged* (*1 arrange*) for us to try fire-walking, which is when you walk on hot coals. I (*2 always/be*) fascinated by it and I (*3 hear*) people say it was an unforgettable experience. I was very excited when I (*4 arrive*) on the day, although beforehand I (*5 feel*) a little frightened! My friends and I (*6 come*) in the hope that by the end of the day we would be able to say we (*7 walk*) across hot, burning coals. Our teacher was very good, and by teatime we (*8 learnt*) a great deal and (*9 prepare*) the fires. I (*10 expect*) to be terrified when the time came to walk, but as I (*11 take off*) my shoes and socks I (*12 not/feel*) afraid. I (*13 approach*) the coals as all my friends before me (*14 do*), and started walking! I could feel the heat, but as I (*15 step*) back onto the grass at the other end I knew the coals (*16 not/burn*) my feet at all. As I (*17 hope*), all my friends (*18 manage*) the walk and none of us were burnt. The whole experience was amazing, and I just wished I _____ (*19 do*) it sooner.

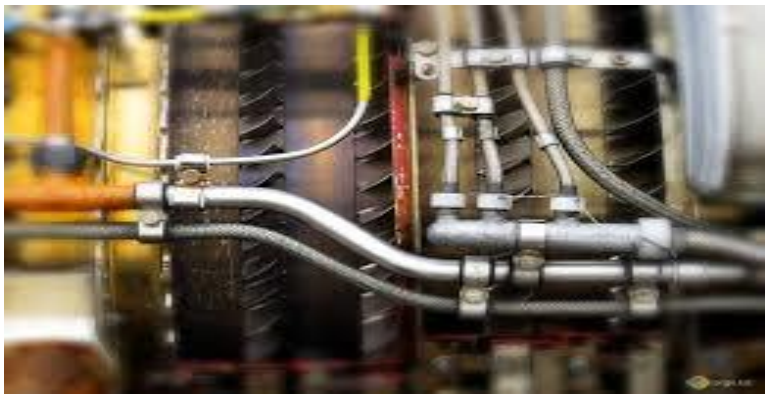
Exercise 7 *In some of these sentences there is a mistake with articles. Underline each mistake and write the correction.*

1 My father likes the classical music and listens to it all the time. ~~*the*~~ *classical music*
2 I saw a man sitting in a restaurant. A woman came and joined him, but the man got up and left without speaking to her! _____
3 Sun was shining and it was a lovely day. _____
4 I can play piano. _____
5 I come from United Arab Emirates. _____
6 I've applied to study at the University of Edinburgh. _____
7 I usually go to work by the bus. _____
8 My husband is doctor. _____
9 Sorry I'm late - car wouldn't start this morning. _____
10 I'm going to take a cruise down river Nile. _____
11 I once saw a cat wearing a pink coat and boots! _____
12 My husband collects the antiques. He's always going to auctions. _____

Unit 9

INSPECTING A HYDRAULIC SYSTEM. PREFLIGHT INSPECTION

Warming up *Describe what you see in the picture.*



Exercise 1 *Read the text.*

A hydraulic system uses a fluid under pressure to drive machinery or move mechanical components.

Virtually all aircraft make use of some hydraulically powered components. In light, general aviation aircraft, this use might be limited to providing pressure to activate the wheel brakes. In larger and more complex aeroplanes, the use of hydraulically powered components is much more common. Depending upon the aircraft concerned, a single hydraulic system, or two or more hydraulic systems working together, might be used to power any or all of the following components:

- wheel brakes
- nose wheel steering
- landing gear retraction/extension
- flaps and slats
- thrust reversers
- spoilers/speed brakes
- flight control surfaces
- cargo doors/loading ramps
- windshield wipers
- propeller pitch control

A hydraulic system consists of the hydraulic fluid plus three major mechanical components. Those components are the "pressure generator" or hydraulic pump, the hydraulically powered "motor" which powers the component concerned and the system "plumbing" which contains and channels the fluid throughout the aircraft as required.

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Exercise 2 *Answer the questions:*

1. What is the primary function of a hydraulic system in an aircraft?
2. What are some examples of components in an aircraft that are typically powered by hydraulics?
3. How do hydraulic systems vary in their usage between light, general aviation aircraft and larger, more complex airplanes?
4. Why are hydraulic systems important for the operation of flight control surfaces?
5. What are the three major mechanical components of a hydraulic system in an aircraft?
6. Can you explain the role of the hydraulic pump in a hydraulic system?
7. How does the hydraulic motor contribute to powering components in an aircraft?
8. What is the function of the system "plumbing" in a hydraulic system?
9. How does the hydraulic fluid contribute to the operation of the hydraulic system?
10. Why is it essential for aircraft maintenance personnel to regularly inspect and maintain hydraulic systems?

Exercise 3 *Complete the sentences with the words in the box.*

levels	***hoses***	***flight***	***immediately***	***failures***	***hydraulic***

Aircraft pre-flight inspection is an essential procedure that involves visual and functional verification of the aircraft's condition, documentation, and operational conditions prior to a _____.

More in-depth inspections that occur weekly include checking fluid _____, filter indicators and all hoses, pipes, fittings and connections. All hydraulic _____ should be inspected for wear, bubbles, leaks and twisting. Any corrosion in pipes needs to be addressed _____.

Before operating a hydraulic system, inspect it thoroughly for low _____ oil fluid levels, signs of leaks, loose fittings, cracked hoses, or any other issues. Addressing potential problems ahead of time can prevent system _____ or accidents caused by malfunctioning hydraulics during operation.

Exercise 4 *Make 5 questions to the text.*

Hydraulic Pumps. Several types of hydraulic pumps driven by a variety of power sources can be found in aviation applications. Pumps include:

Gear Pumps. Gear pumps use meshing gears to pump fluid. Gear pumps are fixed displacement type pumps as they move a specific amount of fluid per rotation. Gear pumps may be used on low pressure systems (under 1500 psi) but are generally not suitable for high pressure applications

Fixed Displacement Piston Pumps. Piston pumps utilize a piston moving in a cylinder to pressurize a fluid. A fixed displacement pump moves a specific amount of fluid with each stroke.

Variable Displacement Piston Pumps. This is the most common type of pump on large aircraft. The variable displacement design allows the pump to compensate for changes in the system demand by increasing or decreasing the fluid output. This allows near constant system pressure to be maintained.

Exercise 5 *Fill in the gaps with words from the box.*

both each every my neither
none this that that their those

My home town is smaller than London, but there are some similarities. 1 *Each* of the two cities is famous for its architecture. For example, 2_____ Kuala Lumpur and London have tall, modern buildings, set amongst older historical buildings. Although both cities have rivers running through them, 3 _____city is by the sea, which is a shame, as I think some of the most beautiful cities in the world are by the sea. 4 _____major city in the world has one thing in common - being large and busy - and 5 _____is true of both London and Kuala Lumpur. In fact, some people don't like my city because it is so noisy and busy, but 6 _____is one reason why I love it. A lot of city markets take place in the day-time, but in 7 _____home city they don't open until it's dark! Malaysians tend to buy all their groceries at the night markets. In London people tend to use supermarkets for 8 _____food shopping. It is always hot in Kuala Lumpur, but London can get very cold. 9 _____'s probably why you get outdoor restaurants all over Kuala Lumpur all year round whereas in London there are almost 10 _____in the winter. In some restaurants in Kuala Lumpur, you can go to the kitchen and point at the food and say, I'll have one of 11 _____, please!' You can't do that in London!

Exercise 6 *Underline the correct words.*

There are many reasons why 1 *we / they* should recycle household waste. The main reason is to avoid using up valuable resources making new things when 2 *it is / we are* not necessary. However I do not think the government should make 3 *it / the law* compulsory tor people to recycle their waste. If the government makes a law that all households must recycle 4 *their / its* rubbish. 5 *the law / it* could lead to room problems. For example, how can 6 *you / people* check that people are recycling everything? 7 *It is not practical to do this. / To do this is not practical.* In addition there is the argument that individuals should be allowed to decide for 8 *each other / themselves* whether to throw something away or to recycle 9 *it / something*. I believe the most sensible approach is tor the government to put more money into recycling schemes. The roost successful are 10 *the ones / them* where the government gives each household special boxes to put different kinds of waste in and 11 *the government / they* provide a regular collection service. 12 *They / There* are separate

boxes for plastic metal, glass etc. This makes 13 *to recycle easier for people / it easier for people to recycle* and 14 *they / there* are therefore less likely to throw things in the rubbish bin.

Exercise 7 *Fill in the gaps with the words in brackets in a comparative or superlative form.*

Teacher: What are 1 *the most obvious* (obvious) differences you have noticed between your own country and this one?
Student: Oh there are so many! In my country people are 2 *not as interested*. (not/interested) in foreigners as people here, who are much 3 _____(friendly). They are always kind and welcoming. Also, the weather is very different. It's much 4 _____(hot) in my country. It's only autumn but I am feeling cold here already and it's getting 5 _____(cold) every day. I don't like that. Then there's the food. Your food is 6 (not/good) ours. Our food is 7 _____(spicy) and 8 _____(delicious). I think it's 9 _____(good) in the world! It is 10 _____(not/expensive) either. I've also noticed that people here eat slightly 11 _____(early) and they eat their meals 12 _____(quickly). And I am beginning to change my own habits too! 13 _____(long) I stay here 14 _____(fast) I seem to be eating.

Unit 10

LANDING GEAR MAINTENANCE

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

A FlySafair Boeing 737 lost a wheel mid-flight but safely landed back in Johannesburg.

Emergency response teams at OR Tambo Airport met the aircraft on the runway and transferred passengers to another plane.

One of the runways at OR Tambo was closed for a few hours, with airlines using a single runway.

On Sunday, April 21, a FlySafair Boeing 737-800 was forced to return to Johannesburg OR Tambo International Airport (JNB) after losing one of its main landing gear wheels. The crew managed to land the aircraft safely, but the runway was closed for a few hours.

The aircraft was operating Flight FA212 from Johannesburg to Cape Town International Airport (CPT). Flightradar24 shows that the flight departed Johannesburg at 11:48 local time, and the initial stages of the flight went as planned. The flight was scheduled to arrive at 13:50.

However, as the aircraft was airborne, the OR Tambo ground staff reported witnessing what appeared to be damage to one of the wheels on the main landing gear. They immediately alerted the flight crew, and a decision was made to return to the airport.

The flight adjusted its course to return to Johannesburg and entered a holding pattern near Parys to burn excess fuel. The crew also performed a low approach over the airport for the safety teams on the ground to make a visual inspection of the landing gear.

The aircraft passed over OR Tambo at approximately 13:20, and the ground crew confirmed that one of the four rear wheels had detached during the takeoff roll. One of the

two wheels attached to the left rear landing strut was affected. The flight entered another holding pattern over Centurion before landing at JNB at 14:06.

Exercise 2 *Answer the questions:*

1. What incident occurred with a FlySafair Boeing 737-800 during its flight from Johannesburg to Cape Town International Airport on April 21?
2. How did the crew respond after discovering damage to one of the main landing gear wheels while the aircraft was airborne?
3. What steps did the flight crew take to prepare for the safe return of the aircraft to Johannesburg OR Tambo International Airport?
4. How did the ground staff at OR Tambo International Airport assist in identifying the issue with the aircraft's landing gear?
5. Describe the actions taken by the flight crew, including adjustments to the flight path and fuel management, after discovering the issue with the landing gear.
6. At what time did the FlySafair Boeing 737-800 pass over OR Tambo International Airport for the visual inspection of the landing gear by the ground crew?
7. What was the condition of the affected landing gear wheel, and how did it impact the aircraft's ability to land safely?
8. How did the closure of one of the runways at OR Tambo International Airport affect flight operations during the incident?
9. How did emergency response teams at OR Tambo International Airport assist after the aircraft safely landed back in Johannesburg?
10. Can you summarize the timeline of events from the initial departure to the safe landing of the FlySafair Boeing 737-800 at Johannesburg OR Tambo International Airport?

Exercise 3 *Complete the sentences with the words in the box.*

landing	***collapse***	***years***	***coating***	***landing gear***

In 2016 a FedEx Boeing MD-10F, an aircraft based on the McDonnell Douglas DC-10, recorded an incident during a _____ at Fort Lauderdale Airport, with the main landing gear collapsing.

Since then, the plane, which was 44 _____ old at the time, has undergone a general inspection, in order to identify the causes of the incident. The entire investigation of the case was conducted by the National Transportation Safety Board, and published on the 23rd.

According to the agency, the MD-10 had a landing gear _____ as a result of structural cracks in the main landing gear. When the component was placed under a structural stress regime, as in the case of a landing, the rupture was made, as a result of the additional fragility of the part.

The body still continued in the report pointing out that a landing gear system, composed of 16 cylinders, did not have a protective layer of cadmium, which was necessary for the component.

The crack was "between the inside diameter surface of the cylinder and the inside surface of the air filling valve", adds the report. This points out that it was notably a problem in the upper part of the _____.

The equipment last underwent an overhaul in February 2008, when technicians applied a cadmium coating to the gear cylinder, a treatment that can prevent fatigue cracking, the NTSB said.

This coating was present in all the mentioned gears, except for one, the one that started the crack that led to the collapse of the landing gear. Probably the _____ came off with the time of the piece, since the maintenance record shows the application in all the required places.

Exercise 4 *Make 5 questions to the text.*

Tricycle landing gear design is standard in General Aviation as it provides stability on the ground and supports the aircraft's center of gravity.

The evolution of landing gear saw a transition from skids and bicycle wheels to the popular taildragger configuration.

Tricycle-style gear became popular in the jet era due to better vision, handling, and prevention of tipping over the nose.

The primary purpose of aircraft landing gears is to withstand the aircraft load upon landing and support it on the ground. Various shapes and designs of landing gears have been seen on aircraft. However, today, most general and commercial aviation aircraft are installed with the conventional tricycle landing gear design.

As the name suggests, the tricycle design has one wheelbase in the front (nose of the aircraft) and two wheelbases around the aircraft's center (near the wings). The tricycle gear is designed to keep the aircraft stable on the ground and provide support according to the aircraft's center of gravity (CG) location. Notably, the size and number of wheels vary with aircraft size and weight.

Exercise 5 *Underline the correct words. Sometimes both options are possible.*

1 In my office you *have to / don't have to* wear a suit but lots of people do. 2 These pills *must not / don't have to* be taken if you are under twelve years old. 3 I *must / have to* leave now because I have a meeting. 4 I *didn't need to go / needn't have gone to* the station to pick her up because she decided to get the bus, so I finished my essay instead. 5 Notice to all conference participants: Please note that *you must / have got to* register before entering the conference hall. 6 You *mustn't / don't have to* smoke inside but you can smoke outside. 7 When I was at university I *must / had to* write my assignments by hand because there weren't any computers then. 8 British dog-owners *have to / must* have passports for their dogs when they travel abroad. 9 Next year *I'll have to / 'll must* get a job to pay back all the money I've borrowed from the bank for my university fees. 10 The

interview went really well so I *didn't need to worry / needn't have worried* about it so much beforehand.

Exercise 6 *Read the extract from an Academic Writing Task. Decide if the underlined phrases are correct or not. Tick (✓) them if they are right and correct them if they are wrong.*

Pollution is causing enormous problems all over the world these days. Governments 1 need to act quickly to stop this problem before it is too late.
The first thing I believe we 2 absolutely should do is reduce the amount we use our cars. Our governments 3 must to encourage us to use public transport. In my country, public transport is not very reliable, so the first thing that governments 4 have to do is to ensure that buses and trains are a viable alternative to the can. They 5 also should reduce the costs to the public of travelling on public transport.
However, it is not only the government that 6 needs to make an effort. All of us 7 should make some effort to reduce pollution. First of all we 8 ought try to walk or cycle if we can, rather than using our cars. In the past people 9 must walk or cycle because they did not have cars. It is a shame that we have become so dependent on cars now. Secondly, we 10 should trying to share car use with our friends and colleagues.
All of us 11 will must make some changes to our lives if we want to reduce pollution. Fortunate, we 12 mustn't make big changes to make big improvements in the situation.

1_____✓_____	5_____	9_____
2 *absolutely must do*	6_____	10_____
3_____	7_____	11_____
4_____	8_____	12_____

Exercise 7 *Fill in the gaps with the correct form of (not) have to, ought to or must(n't) and the verbs in brackets.*

Teacher: Do you think it's a good thing for young people to travel to different countries before settling down to a job?
Student: Yes, I think it's a really exciting and interesting thing to do.
Teacher: What 1 *do you to think* (you/think) about if you're going to go travelling?
Student: Well, you 2 _____(consider) lots of things first. For example, you 3 (have) enough money in the first place, so you 4 _____(work) a bit first to save some money. Then another important thing to consider is who to go with. You 5 _____(travel) with a friend, but it is probably safer and less lonely if you do. Also, you 6 _____(learn) a bit about the countries before you go. It's a good idea to research cultural issues, so that you don't offend people by your behavior. If you go to Nepal, for example, you 7 _____(shout) or raise your voice in public, and you 8 _____(always/walk) around a Buddhist temple in a clockwise direction. You 9 _____ (find out) these things before you go.
Teacher: What things 10 _____(you/arrange) before you travel?
Student: Well, to visit some countries you 11 _____(have) a visa, so you 12 _____(organise) that before you go.

MODULE 3 Aircraft maintenance (Part 3)

Unit 11

WINGS MAINTENANCE

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

The repair and overhaul of flight structures is a critical aspect of maintaining the safety and performance of an aircraft.

EASA Extends A320ceo Wing Fatigue Cracking Inspections To All A320neo Models

Initially, EASA required operators to inspect certain areas of the wing for only the A320ceo aircraft family.

EASA has extended inspections for certain areas of the wings of Airbus A320ceo family aircraft to the A320neo family. The new directive superseded the previous one.

If any fatigue cracks are found during inspections, airlines must contact Airbus for approved repair instructions, and specific actions have been outlined for Airbus A321neo aircraft.

The European Union Aviation Safety Agency (EASA) has superseded a previous airworthiness directive (AD), extending inspections of certain areas of left-hand and right-hand side wings for all Airbus A320ceo and A321neo family aircraft that have the Sharklets modification installed on them.

Previously, the directive only required operators to inspect A319ceo, A320ceo, and A321ceo wing manhole access panel attachment holes in the bottom wing skin panels 2, between Rib 13 and Rib 23. The European regulator superseded the AD on January 25, 2024.

According to EASA, fatigue cracking might happen in the affected areas of the wings if an affected aircraft has the Sharklets installed. While all Airbus A320neo family aircraft come with modifications from the factory, some A320ceo family aircraft were built with wingtip fences. The manufacturer introduced the extended winglets in 2009, delivering the first Airbus A320 with Sharklets in 2012. The Sharklet retrofit program began in 2013.

"This condition, if not detected and corrected, could lead to crack initiation and propagation, possibly resulting in reduced structural integrity of the wings."

Exercise 2 *Answer the questions:*

1. Why is the repair and overhaul of flight structures considered crucial for aircraft safety and performance?
2. What prompted EASA to extend inspections for certain areas of the wings of Airbus A320ceo family aircraft to include the A320neo family?
3. How does the new directive from EASA impact airlines and operators in terms of wing inspections and maintenance?
4. What specific actions must airlines take if fatigue cracks are discovered during inspections of Airbus A320ceo and A321neo family aircraft wings?
5. What modifications were introduced by Airbus that could potentially lead to fatigue cracking in certain areas of the wings?
6. What is the significance of the Sharklet modification in relation to wing inspections and potential fatigue cracking?
7. How did the previous airworthiness directive differ from the one superseded by EASA on January 25, 2024?
8. What areas of the wings were previously required to be inspected, and how has this requirement changed with the new directive?
9. How does EASA describe the potential consequences of not detecting and correcting fatigue cracking in the affected areas of the wings?
10. Can you explain the timeline of the Sharklet retrofit program and its relevance to the inspection and maintenance of Airbus A320ceo and A321neo family aircraft?

Exercise 3 *Complete the sentences with the words in the box.*

repair	***wings***	***cracks***	***instructions***

Inspections and corrective actions for potential cracks

For Group 1 aircraft, EASA has defined several thresholds, depending on the MOD and/or SBs used to fit Sharklets, to accomplish DETs of the affected areas. Airlines must contact Airbus before the jet's next flight for approved _____ instructions if any fatigue _____ are found. Inspections and corrective actions done before the effective date of the directive are accepted as compliant with the AD.

However, airlines still have to report the results of each DET of the affected areas of the _____ to Airbus. Specific actions were defined for Airbus A321neo aircraft, with

operators having to contact the manufacturer for approved repair _____ within five months of the directive's effective date.

Exercise 4 *Make 5 questions to the text.*

- Winglets are vertical extensions of wingtips that improve fuel efficiency and cruising range by reducing drag caused by vortices.
- The most popular types of winglets in commercial aviation are canted, blended, split-scimitar, and sharklets.
- Each type of winglet has its own specific design and benefits, with some being more efficient than others.

Winglets are now a mainstay in commercial aviation. However, their journey has come a long way over the decades. Although they have been conceptualized for over a century, the B747-400 was the first commercial plane to feature these devices.

Boeing highlights that the aircraft's winglets increased its range by 3.5% over the 747-300. Before we look at the different types of winglets, it is important to understand what they are and why they became such a hit.

Exercise 5 *Underline the correct verb in each sentence.*

1 Some people *argue/remind* that banning cars from city centres would reduce pollution.

2 The organisation campaigns against pollution and for the environment and they *insist/urge* people to start walking and cycling more.

3 My boyfriend is always forgetting things so it was a good thing I *reminded/suggested* him to bring his passport when we went on holiday.

4 I was very unhappy with the service so I *complained/insisted* to the manager and he gave me a discount on my meal.

5 I needed to talk to my boss so I *reminded/suggested* a meeting and we arranged one for later that day.

6 The students felt very strongly about the issue and *refused/insisted* on seeing the vice-chancellor to discuss it.

7 I asked him really nicely but he still *refused/denied* to help me.

8 The tennis player regretted his actions and *blamed/apologized* for his behavior afterwards.

9 Jane was having difficulties sleeping and the doctor *advised/suggested* her to take some rest from her heavy work schedule.

10 The armed robbers *warned/announced* the bank staff not to move or they might use their guns.

Exercise 6 *Correct the mistakes in these sentences.*

1 I met Annie and ~~she said me~~ she was getting married. *She told me / she said*

2 The education minister encouraged students take out a loan to cover their fees. _____

3 At the interview he asked did 1 want to start the job tomorrow! _____

4 The speaker urged people that they should vote for him. _____

5 We agreed making our presentation to the group first. _____

6 My tutor promised mark the first draft of my dissertation immediately. _____

7 Jacques invited us going to his house for dinner on Friday. _____

8 During the Speaking module the examiner asked me what were my hobbies. _____

9 The customers complained the quality of the food. _____

10 When the college announced about the changes, everyone was worried. _____

11 I wanted to pay for myself but my boyfriend insisted to pay. _____

12 The university sent me an email asking me when would I be arriving. _____

Exercise 7 *Report each of the sentences below using a verb from the box. Remember that you do not need to report the original words exactly.*

agree apologise ask ask deny encourage persuaded promise refuse suggest

1 “We are going to lower taxes and reduce unemployment!”

The government *promised to lower taxes and reduce unemployment.*

2 “I really think you should apply for the job. You’d have a good chance of getting it.” She _____

3 “No, I won’t help you. Do it yourself!”

He _____

4 “Oh, okay, I’ll go to the meeting.”

She _____

5 “I didn’t cause the accident. It wasn’t me.”

He _____

6 “We are very sorry that we lost your application form.”

They _____

7 “Why aren’t there many poisonous snakes in Britain?”

He _____

8 “Are you going to the lecture tomorrow?”

She _____

9 “Why don’t you have a day off? You could do with a rest.”

She _____

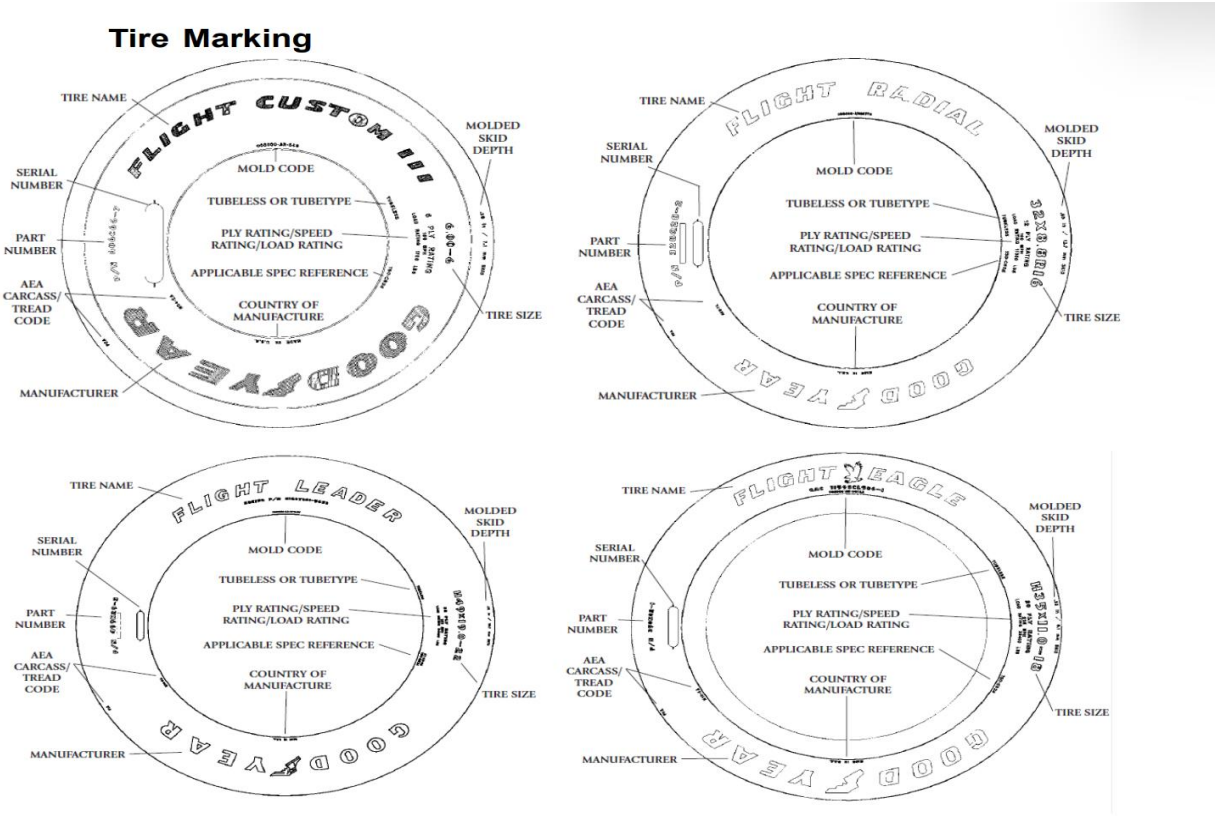
10 “Please come to the theatre with me, Dan. I really think you’ll enjoy it.”

"Oh, alright then, Claire."
Clair ____

Unit 12

TIRES MAINTENANCE

Warming up *Describe what you see in the picture.*



Exercise 1 *Read the text.*

Bias and Radial Aircraft Tire Guidelines Radial aircraft tires may exhibit different characteristics than bias aircraft tires when operated under similar conditions. The following guidelines are recommended: 1. The airframe must be certified for use of radial tires in place of bias or vice versa. Questions concerning the certification of a given aircraft must be referred to the airframe manufacturer. 2. Radial aircraft tires should not be mounted on wheels designed for bias ply tires or bias tires on wheels designed for radial tires without first checking with the wheel manufacturer. 3. It is acceptable to mount bias tires on nose positions and radial tires on main positions, or vice versa, on the same aircraft. 4. For Return to Base Operation Only: In case a tire replacement is needed in a remote location, the position may be filled with an appropriate tire of the other construction for return to base operation only.

All Goodyear commercial aircraft tires are clearly marked with the following information: Goodyear, size, load rating, speed rating, molded skid depth, Goodyear part number, serial number, Goodyear plant identification and TSO marking. In addition, Goodyear tires are marked with the ply rating and other markings as required by airframe manufacturers or other organizations, such as an AEA code (which defines new tire casing and tread construction).

All TSO-C62b qualified tires with a speed rating of 160 mph or less and all TSO-C62c and TSO-C62d qualified tires do not require requalification to TSO-C62e unless the tire is changed. Tires retreaded by all of Goodyear's facilities have the following information marked in the shoulder: the size, ply rating, speed category, retread plant and/or country of retreading, as well as retread level (R-Level), date of retreading and retread AEA code if appropriate. Aircraft Tire Serial Number Codes Goodyear serials consist of 8 characters, showing the date and plant of manufacture. Each tire has a unique code. The digits are organized: YJJJNNNN Positions 1-4 (YJJJ) represent the year (Y) and Julian Date (JJJ) of production. Positions 5-8 (NNNN) show the decade and plant of manufacture. Plant Even Decade (2000, 2020…) Odd Decade (1990, 2010…) Danville 0001 to 2000 2001-4999 Thailand 5001 to 5500 5501-5999 Brazil 7100 to 7500 7501-7999 NOTE: Prior to 2001, tires produced in Thailand showed a 'T' in the 5th position, and tires produced in Brazil had a 'B' in the 5th position.

Exercise 2 *Answer the questions:*

1. What certification is required for an airframe to use radial tires instead of bias tires, or vice versa?
2. Before mounting radial aircraft tires on wheels designed for bias tires, what precaution should be taken according to the guidelines?
3. Is it permissible to have a mix of bias and radial tires on different positions (nose vs. main) of the same aircraft?
4. Under what circumstances can a different type of tire (bias or radial) be temporarily used for "return to base" operation?
5. What information is typically marked on all Goodyear commercial aircraft tires, according to the provided guidelines?
6. What criteria determine whether TSO-C62b qualified tires require requalification to TSO-C62e?
7. What information is marked on the shoulder of tires retreaded by Goodyear facilities?
8. How is the serial number of Goodyear aircraft tires organized, and what does each part of the serial number represent?
9. How can you determine the year and Julian date of production from a Goodyear aircraft tire serial number?
10. Prior to 2001, how were tires produced in Thailand and Brazil identified differently in their serial numbers?

Exercise 3 *Complete the sentences with the words in the box.*

temperatures	***ambient***	***approximately***	***pressures***	***flight***	***FOD***

CHECK DAILY WHEN TIRES ARE COOL. Tire pressures should always be checked with the tire at ambient _____. Tire temperatures can rise in excess of 200°F (93°C) above ambient during operation. A temperature change of 5°F (3°C)

produces _____ one percent (1%) pressure change. It can take up to 3 hours or more after a flight for tire temperatures to return to _____. A tire/wheel assembly can lose as much as five percent (5%) of the inflation pressure in a 24-hour period and still be considered normal. This means that tire _____ change on a daily basis. Even a tire which does not normally lose pressure can become damaged by _____ or other outside factors that can suddenly increase pressure loss. These are all reasons why it is important to check pressure daily or before each _____.

Exercise 4 *Make 5 questions to the text.*

Condition of Airport and Hangar Floor Surfaces Regardless of the excellence of any preventive maintenance program, or the care taken by the pilot and ground crew in handling the aircraft, tire damage will certainly result if runways, taxi strips, ramps and other paved areas of an airfield are in a poor condition or improperly maintained. Foreign object damage (FOD) is the most common cause for early removals. Chuck holes, cracks in pavement or asphalt, or stepoffs from pavement to ground can cause tire damage. Pavement breaks and debris should be reported to airport personnel for immediate repair or removal. Another hazardous condition is the accumulation of loose material on paved areas and hangar floors. These areas should be kept clean of stones, tools, bolts, rivets and other foreign materials at all times. With care and caution in the hangars and around the airport, tire damage can be minimized. This photo shows items removed from tires that have been returned for retreading.

Exercise 5 *Underline the correct form of the verbs.*

1 Mario remembered *to give / <u>giving</u>* his assignment to his tutor because he had spoken to her about its length, but she insisted that she had never received it.

2 If you can't find the information at the library, try *to look / looking* on the Internet.

3 She studied medicine at university and went on *to become / becoming* a surgeon.

4 Look at Mum's car! It definitely needs *to clean / cleaning*!

5 I'll never forget *to fall /falling* off that swing when I was a child.

6 I was really nervous about the interview, and although I tried *not to worry / not worrying*, I was awake most of the night.

7 The new government needs *to take / taking* notice of the opinions of the people.

8 It seems that the new system of sending out reminders has worked, because this year 90% of members remembered *to renew / renewing* their membership in time.

9 Economists predict that house prices will go on *to rise / rising* for at least another year.

10 We weren't able to see the concert because Tamsin forgot *to bring / bringing* the tickets.

Exercise 6 *Fill in the gaps in the letter using both of the verbs in brackets.*

Dear Sir,

I am writing to complain about the service I received in your hotel at the weekend. I arrived at your hotel at lunchtime on Friday and your receptionist 1 *told me to take* (tell/me/take) a seat while she dealt with some other customers. I 2 _____ (not feel like/wait) after a long journey but I sat down anyway. However, after your receptionist 3 _____(finish/talk) to the other customers she walked away and left no one behind the desk. After about ten minutes, I rang the bell, but still no one came. I 4 _____(try/find) someone else to help me, and when I 5 _____(fail/do) this I went behind the desk and called through the door. The receptionist was sitting in the back room at the computer. When she 6 _____(see/me/stand) in the doorway, she apologized and said she 7 _____(need/send) an urgent email and 8 _____(carry on/look) at her screen. If this had been the only poor service I received during my stay, I would not 9 _____(bother/write) this letter. However, later that evening, in the dining room, I had another bad experience. Your menu only had one vegetarian dish, so I ordered this. Imagine my horror when I 10 _____(start/eat) and discovered meat in the dish. I 11 _____(consider/leave) immediately, but instead I explained the situation to the waiter. I 12 _____(expect/him/get) me another vegetarian meal, but instead he simply shrugged his shoulders, removed the plate and walked away. I 13 _____(hope/receive) a full apology from you for this poor service and some recompense for the unpleasant time I experienced whilst staying in your hotel. I 14 _____ (advise/you/give) your staff some customer care training in the immediate future.

Yours faithfully,
Geraint Rees

Exercise 7 *Underline the correct words.*

1 I'll put my umbrella in my bag *in case / provided* that it rains later.

2 *Unless / As long as* you pay me in advance, I'll buy the tickets for you.

3 I'm going to get fat *if / unless* I stop eating so much chocolate.

4 You must follow the instructions accurately *in case / unless* you want to risk damaging the machine.

5 When I travel on planes I always, put my toothbrush in my hand luggage *in case / if* my suitcase gets lost.

6 Ice skating is fun *as long as / when* you are willing to fall over a lot!

7 Dear Mr Brown, I am writing to inform you that your library books are overdue. *Provided that / When* you return them immediately, you will not be fined.

8 I've just signed the contract for the job in Indonesia, starting in April. *When / If* I move there, I'll have to sell my car.

9 I wouldn't stay out in the sun too long *as long as / if* I were you.

10 I don't really like going to parties *unless / as long as* I know most people there.

Unit 13

WHEELS AND BRAKES MAINTENANCE

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

Who Makes The Wheels? A Closer Look At 5 Major Landing Gear Companies

Aircraft parts manufacturers make the landing gear and the leading companies are based in North America and Europe. It turns out that without the proper landing gear, aircraft have a wheely-big problem. One may think that Boeing produces Boeing aircraft and Airbus produces Airbus aircraft - that is true on a zoomed-out, macro level, but zoom-in and the components of these aircraft are made by a wide range of aircraft parts manufacturers worldwide. According to Mordor Intelligence, the five most prominent manufacturers of aircraft landing gear are Safran SA, Héroux-Devtek Inc., Honeywell, Collins Aerospace (part of Raytheon), and Liebherr. There is much to know about aircraft landing gear (it is much more complicated and advanced than many people may release). So, major players in the Aircraft Landing Gear companies include Collins Aerospace (US), Safran (France), Héroux-Devtek (Canada), Liebherr (Switzerland), Triumph Group (US) to enhance their presence in the market.

The most relevant aspect determining the strength of an aircraft's tire is its pressure, which is six times the one you find in the average automotive tire.

Treads on an aircraft tire differ from the blocks found on a car's tire, and nitrogen is used instead of air to inflate aircraft wheels.

Parallel grooves are used instead of block treads to enhance the plane's tire performance, which can perform between 120 and 300 landings on average before being replaced.

Aircraft wheels and their braking system paved the way for the anti-lock braking system (ABS) now used on cars.

They say details make the difference in life. Aviation is no exception. When we talk about airplanes, our minds immediately think of them in their entirety. However, these complex machines are the result of millions of different parts that harmoniously work together. Each is essential; take one away, and the aircraft might not be flying-worthy.

Some of these numerous components are not even necessary throughout a flight. An aircraft's wheels are a good example. Although essential during taxiing, take-off, and landing, they play no role when the aircraft is flying. However, when on the ground, the wheels' structure and the quality of the tires are fundamental for operational safety. As you might reasonably expect, aircraft tires differ to a relevant extent from your car's. The engineering and technology behind aircraft tires are fascinating, so ,you might not know about these five interesting facts.

Exercise 2 *Answer the questions:*

1. Who are the five major manufacturers of aircraft landing gear according to Mordor Intelligence?
2. How does the manufacturing of aircraft components differ from the common assumption that Boeing produces Boeing aircraft and Airbus produces Airbus aircraft?
3. What are some key differences between aircraft tires and automotive tires, particularly regarding pressure and tread design?
4. Why is nitrogen used instead of air to inflate aircraft wheels?
5. What specific design feature distinguishes the tread of an aircraft tire from that of a car tire?
6. How many landings, on average, can an aircraft tire perform before needing replacement?
7. In what way did aircraft wheels and their braking systems influence the development of anti-lock braking systems (ABS) used in cars?
8. Why are aircraft wheels and tires crucial for operational safety, particularly during taxiing, take-off, and landing?
9. Despite playing no role during flight, why are the structure and quality of aircraft wheels and tires considered fundamental?
10. Can you provide five interesting facts about aircraft tires that differentiate them from automotive tires, as mentioned in the article?

Exercise 3 *Complete the sentences with the words in the box.*

commercial	***wheels***	***tricycle***	***undercarriage***	***wheels***

Moving to the tricycle gear layout

By the jet era of the 1950s, almost all _____ airliners had switched to a tricycle _____ arrangement. Better vision, better handling, and no need to keep the nose above the ground for propeller protection have led to the switch. The _____ design prevents the aircraft from tipping over its nose.

Today, only a few smaller aircraft and some military aircraft use anything different. Aircraft will have different layouts or numbers of _____ as part of the landing gear structure, but the basic tricycle arrangement is the same.

The A340 adds an extra middle landing gear to increase its maximum take-off weight (as did the DC-10-30/40 and MD-11), but it is still the same arrangement. Even the largest Antonov An-225 has the same tricycle arrangement, albeit with an impressive 32 _____ to handle its weight.

Exercise 4 *Make 5 questions to the text.*

Better vision and handling on the ground

The tricycle landing gear lowers the cockpit and offers improved forward vision. In a taildragger aircraft, vision is elevated and also partially blocked by the aircraft nose in front.

Better vision and handling on the ground

The tricycle landing gear lowers the cockpit and offers improved forward vision. In a taildragger aircraft, vision is elevated and also partially blocked by the aircraft nose in front.

But with a wing-mounted jet engine, a horizontal engine is much better. This keeps the engines even above the ground and easy to access for maintenance. It also importantly stops the jet engine blast from damaging the ground or runway surface, as it would if directed downwards.

We mostly take tricycle landing gears for granted these days as the standard for commercial jet aircraft. What are your thoughts about the evolution of landing gears over the years?

Exercise 5 *Find and correct the mistakes in the sentences below.*

1 If I hadn't ~~ate~~ *eaten* so much I wouldn't have a stomach ache now.

2 What would you done if you'd failed the exam?

3 I am starting university next autumn if I hadn't had such bad exam results.

4 If the government would have kept their promise, taxes wouldn't have gone up last year.

5 I would have finished my essay on time if I didn't have the accident.

6 If I was getting married next weekend, I was very excited by now.

7 If the economic conditions had been better when I bought this house, I might make a fortune by now.

8 Life today will be very different if Thomas Edison hadn't invented the electric light.

9 If you were more considerate, you didn't make so much noise last night.

10 If I didn't go to university, I wouldn't be doing this job now.

Exercise 6 *Fill in the gaps using wish or should and the words in brackets in the correct form.*

1 You shouldn't have left (*not/leave*) school so young. You'd have a better job now.
2 I really _____(*you/ask*) me before borrowing the car yesterday. I needed to use it.
3 I'm not enjoying my degree course at all. I _____(*I/not/choose*) physics. I _____(choose) maths instead because I used to love it at school.
4 I _____(*I/study*) languages at school because now I travel regularly for work to Berlin and Paris.
5 That man is really annoying me. I _____(*he/stop*) whistling.
6 We're lost again. We always get lost when you have the map. You _____(*let*) me have the map from the start!
7 I _____(*I/have*) more time to work on this assignment. I'm worried I won't finish it by the deadline.
8 I _____(*it/stop*) raining. I want to go for a walk.
9 I have terrible problems with my knees. I _____(*I/not/do*) so much running when I was younger.
10 You _____(*not/tell*) Paula about the party - it was meant to be a surprise.

Exercise 7 *In nine of these sentences there is a wrong preposition. Underline each mistake and write the correction.*

1 There has been a rise in the number of people buying their own homes. *Correct*
2 It is not difficult to distinguish amongst the emotional response to this crime and the law's response. _____
3 There is no need about a new school in this area. _____
4 We want the government to promise to make a change in the law. _____
5 I hate the way she always laughs to people. _____
6 I've decided to apply to that job in the newspaper. _____
7 Professor Ho has a good knowledge about his subject. _____
8 I'm afraid I broke this glass in accident. _____
9 My husband's staying at my cousin while he is on business in America. _____
10 I gave him one of my paintings in return for his help when I moved house. _____
11 Why do governments always insist in doing things that are unpopular? _____
12 When I was in school I did much more sport than I do these day. _____

Unit 14

AIRCRAFT TOWING

Warming up *Describe what you see in the picture.*

Exercise 1 *Read the text.*

There are several reported cases (documented and undocumented) of near incursions and mishaps involving tug operators moving aircraft. Specifically, super tugs have had incidents such as jackknifing, uncontrolled movement, and inability to stop the tug and aircraft quickly. There have been several potential ground incursion instances where super tugs were not seen by the aircraft and ground controllers. There have also been reported cases where pilots are not cognizant to the “right of way passage” of these tugs, even when they are cleared for movement in the active areas. Lastly, air traffic control (ATC) specialists have reported that it is very difficult to identify a super tug towing an un-powered aircraft at night, because the aircraft being towed is not illuminated with any lights. For ATC and other pilots in the area, this creates the optical illusion that the low profile super tug is by itself, making the large, dark aircraft being towed nearly invisible.

Operators should ensure aircraft ground handling personnel become thoroughly familiar with all published towing procedures pertaining to the type of aircraft being towed, along with understanding the restrictions and/or limitations on any vehicle authorized to move an aircraft. (3) Initial and recurrent training should include: • Speed restrictions both for clear and cluttered ramp conditions; • Speed restrictions for contaminated pavement conditions; • The effects of momentum towing various weights and speeds; • Airport signage and markings; • Prior to use, vehicle safety inspection; • Crew Resource Management (CRM); • Situational awareness (SA); • Use of written

checklists (see Appendix 1 for checklist example); • Acceleration and deceleration characteristics and techniques; • Braking in turns; • ATC communications procedures; • Tug/aircraft configuration; i.e., lighting;

• Emergency procedures; and • Recurrent training. (4) Consideration should be given to the employee's speech and accent, if any, relative to sentence patterns, sentence structure, and in the case of an ATC clearance, use of standard clearance terminology is satisfactory. (5) Newly assigned aircraft maintenance specialists/ground movement personnel should pass a proficiency test on the types of aircraft towed, after completing supervised OJT. (6) Wing and tail walkers may not have to be familiar with all published towing procedures or receive annual proficiency training if their duties are restricted to these positions during towing operations. Additionally, recurrent training should include, but not be limited to, airport signage, limitations or restrictions, ATC communications procedures, and radio and light commands, and should be completed before the initial performance of such duties at least once annually. (7) A high degree of safety is the responsibility of all personnel involved in moving an aircraft.

Exercise 2 *Answer the questions:*

1. What types of incidents involving super tugs have been reported, and what are some potential risks associated with their operation?
2. Why is it challenging for air traffic control specialists to identify super tugs towing un-powered aircraft at night, and what safety implications does this present?
3. What are some key components that should be included in initial and recurrent training for aircraft ground handling personnel?
4. How can operators ensure that ground handling personnel are thoroughly familiar with towing procedures and understand the restrictions and limitations on any vehicle authorized to move an aircraft?
5. What are some specific topics that should be covered in initial and recurrent training for ground handling personnel, according to the provided guidelines?
6. What considerations should be made regarding the speech and accent of newly assigned aircraft maintenance specialists/ground movement personnel in relation to communication during towing operations?
7. What proficiency test should newly assigned aircraft maintenance specialists/ground movement personnel pass, and when should this test be completed?
8. Under what circumstances may wing and tail walkers not need to be familiar with all published towing procedures or receive annual proficiency training?

9. What are some key aspects of recurrent training for wing and tail walkers, and when should this training be completed?

10. Whose responsibility is it to ensure a high degree of safety during aircraft movement operations, according to the provided guidelines?

Exercise 3 *Complete the sentences with the words in the box.*

training	***heavy***	***towbarless***	***weight***	***pounds***	***vehicles***

Operators that use the towbarless tractor should submit appropriate procedures outlining the towing operations to their certificate-holding district office (CHDO). The procedures should include, but not be limited to, the following: • Safety instructions; • Operating procedures (include the differences between day and night operations); • Initial and recurrent _____; • Radio communication; and • Towing procedures checklist.

TOWBAR AND TOWBARLESS TOWING OF AIRCRAFT by Towbarless Tractor. High speed tugs such as Goldhofer Aircraft System Tractor Models AST-1 and AST-1X, Douglas Equipment, and the FMC Expediter family of _____ tractors, sometimes referred to as "super tugs," usually move aircraft between the terminal gates to maintenance hangars. The weight of an aircraft and its fuel load is a major consideration during towing because handling characteristics of the tow tractor changes proportionally with the change in aircraft weight. Heavier aircraft put more stress on the vehicle. After movement begins, _____ aircraft can "push" the tug with a greater force than lighter aircraft because of weight and momentum. Tow operators must recognize and understand these characteristics.

Heavier weights and too much speed create the potential for disaster. Therefore, reduce towing speeds according to the _____ of the aircraft. The braking distance required to stop a large aircraft will be greater than the distance required to stop a smaller aircraft. 8/27/09 AC 00-65 Par 8 Page 5 b. Towing Vehicles. A few of the many tow vehicles used by operators to move aircraft are as follows: (1) The Lynco Tugger Corporation's 4 KD4 is a patented fully hydra-static tow vehicle with a 48-inch turning radius. Load capacity of 60,000 pounds with a level drawbar pull of 4,000 pounds. (2) Harlan currently produces more than seven standard model tractors. These _____ range from 3,000 to 20,000 pounds drawbar pull. The A/S32A-37 aircraft towing tractor is an inline, 6-cylinder, diesel-powered, liquid-cooled, 4-wheel drive vehicle used to move heavy aircraft. The A/S32A-42 aircraft mid-range tow vehicle is a 4-cylinder, diesel-powered, liquid-cooled, 4-wheel drive vehicle used to move medium aircraft. (3) Aero Specialties is the exclusive corporate and fixed-base operator distributor of Eagle Tugs. With a towing capacity of up to 180,000 _____ , Eagle Tugs are the only aircraft tractors in their class with available all wheel drive and limited slip differential.

Exercise 4 *Make 5 questions to the text.*

Flight Deck/Cockpit Observer. A trained and authorized person should be in the pilot's seat to operate the aircraft's brakes if needed. If the hydraulic pressure that provides braking drops below safe operating limits, the towing operation should be terminated. Additionally, the observer serves as the primary person communicating with the control tower and/or ramp control, and with the tow vehicle operator as a backup. Flight deck/cockpit observer duties include looking outside the cockpit and warning the tow vehicle operator of possible safety issues.

The communication roles of the Towbarless Tow Vehicle (TLTV) driver and observer should be clearly defined and understood before every tow operation. g. Tow Vehicle Operator. The tow vehicle driver is responsible for operating the vehicle in a safe manner. The vehicle operator should follow all direction from the flight deck as they are directed by the control tower and also obey emergency stop instructions given by any team member. A trained vehicle operator should be at the controls of the towing vehicle at all times during aircraft movement. The vehicle operator should stop the vehicle upon losing communication with the cockpit observer and, unless on an active runway, proceed to safely clear the runway.

Wing Walker. Station a wing walker at each wingtip to ensure adequate clearance of any obstruction in the path of the aircraft. The wing walker is responsible for properly signaling the tow vehicle operator as soon as it appears the aircraft is in danger of colliding with an obstruction. In such cases, stop towing until the vehicle operator personally checks the clearance. Wing walkers are not required for helicopters being towed with rotor blades in parallel position. Wing walkers do not require annual proficiency testing and need not be fully qualified in all towing procedures.

Tail Walker. Use a tail walker during towing operations when you turn the aircraft sharply or back into position. Avoid backing of aircraft as much as possible. Tail walkers do not require annual proficiency testing and need not be fully qualified in all towing procedures as long as this is their only task.

Exercise 5 Identify Passive Voice. Do the task: https://en.islcollective.com/english-esl-worksheets/grammar-practice/general-grammar-practice/passive-voice-or-active-voice/present-simple-passive-1/75047

Exercise 6 Do the final Grammar test B2 level : https://en.islcollective.com/english-esl-worksheets/queen-reading-comprehension-exercises/114605

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