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FOREWORD

FOR THE STUDENT

The aim

*English for Aircraft* will help you use aeronautical manuals more easily. It is designed for civilian or military technicians, engineers and mechanics and can be used with a qualified teacher in a training course or for self-study. It is for users of English with an intermediate level in written English.

The contents

There are 26 Modules, 4 Review Modules, an Exercise Key and an Index. Each Module covers a subject that will help you to read more efficiently. The subjects in Parts One and Two are more general than in Parts Three and Four. Do not forget to read the introduction at the beginning of each Part, as well as the following notes on how to use the book.

The Modules have short, practical explanations with authentic examples ("Notes") and exercises to enable you to put the points into practice immediately. The book is based on the principle of "learning by doing". You can check your answers in the Exercise Key.

The examples are taken from all aircraft systems in Airbus Industrie, Boeing, Fokker, McDonnell Douglas and various suppliers' Aircraft Maintenance Manuals, Checklists, Structural Repair Manuals, Illustrated Parts Catalogs, Service Bulletins, Airworthiness Directives, Flight Manuals, Training Manuals, etc.

Remember to use this book in conjunction with your own documentation. After each Module or two, look for examples in your own manuals and put into practice the approaches to reading explained here. Take your time to work through the book gradually.

The book is in English and there are no translations. "Think English!" It is easier than you imagine.

There is also a companion volume, *System Maintenance*, which is a selection of longer texts and activities from all the ATA chapters. This enables you to apply what you learn in this book to real examples and to choose the systems that interest you most.

Using the book

*English for Aircraft* is designed to adapt to different needs and different levels of English and is not just for the classroom. It can be integrated into your place of work and consulted regularly. Frequent use is more effective than prolonged periods of study. Compare the materials in *English for Aircraft* with the actual documents you work on every day.

Use *English for Aircraft*:
- in a classroom (with a group) as the backbone of a structured course;
- individually for self-study, revision or reference purposes;
- from A to Z, in a methodical progression, going from the basic points through to the more complex vocabulary;
- by choosing the Modules which cover the points which you find most important or most difficult.

Any learning process will include phases of acquisition (the "Notes" sections) and phases of application (the "Exercise" sections). These phases can be either collective or individual, but great benefit will be gained from the linguistic and technical exchange between students working together.

Examples and exercises

The first volume, the *Documentation Handbook*, contains the basic principles, structure and vocabulary of aeronautical English, with a large number of authentic one-sentence examples from all aircraft systems. The second volume, *System Maintenance*, provides extensive texts and illustrations from all ATA chapters as well
as activities which are not purely linguistic but also technically-based. A cross-reference system in System Maintenance enables you to move from one volume to the other and so consolidate your knowledge.

A Module often contains more than one exercise. Do not do them all at once. It is preferable to return to points you have already seen by doing the exercises in two or three stages and by choosing the related activities in System Maintenance.

The language used

The official language of aviation is American, as opposed to British English. This is why American spelling has been adopted throughout and, in the few cases where differences exist, American technical names have been preferred to British ones.

English for Aircraft reflects the language used in present-day aeronautical documentation. The examples are all taken from aircraft designed within the last twenty years and which will be in service until the year 2010 or 2025.

Simplified English

Since 1986, most aircraft and component maintenance manuals reflect the requirements of Simplified English, without implementing them entirely, as yet.

The general principles of Simplified English are described briefly in Module X. Nevertheless, we were not able to restrict ourselves to Simplified English in the Notes and examples of English for Aircraft. For many years to come, users of aeronautical documentation will have to deal with both Simplified and conventional English.

FOR THE TEACHER

Practical, relevant language

English for Aircraft is the result of years of extensive use of these materials with aircraft technicians. The materials have evolved to cater for not only language-teaching but also practical and technical considerations. The technician's goal is technical rather than purely linguistic accuracy, and accuracy ultimately means safety. In other words, the teacher's first job is to allow his or her students to transform the language from a barrier into a tool. Therefore, the English used needs to become self-effacing and transparent. Style and grammar must know how to play second fiddle to content and purpose. It is important to remember that this is a field where students are particularly sensitive to the relevance of the material chosen.

Knowing about aircraft

The teacher who uses English for Aircraft with a class should have at least a superficial, first-hand knowledge of aircraft and aircraft systems, and preferably some basic scientific or technical notions. The world that lies behind each technical term and schematic, the world of aluminum alloy, steel, titanium, space-age materials, real-time computation and the harnessing of natural forces should captivate the teacher as much as it already does the students whose enthusiasm for their profession should fire any course and enhance language acquisition.

Course organisation

It is preferable to divide the course into a number of separate days, allowing the students to do a measured amount of self-study, preparation and application between the group sessions.

The points made above in “Using the book” are valid for the conduct of a course. It is essential to play on the complementarity of the Documentation Handbook and examples of documentation, taken preferably from aircraft and systems known to the students. It is also important to go beyond reading exercises to creative and communicative activities entailing group writing and oral exchange. This makes acquisition much more artful and explicit.

Students need to be encouraged to approach texts in a more active, purposeful way: to know what
they want, to know what they are looking for and where to look for it, to know how to use the various signposts, to know how to classify information, etc.

The skills which *English for Aircraft* tries to develop lend themselves particularly well to computer-based activities reviewing the various points covered in the *Documentation Handbook*. These can be done individually or in a group.

**Acknowledgements**

I am extremely grateful to *Airbus Industrie, Air France and Air Inter* for kindly giving me access to all the documents and illustrations required in the preparation of *English for Aircraft*. I am also indebted to the many students who enabled me to improve and perfect the exercises contained in the books.

Philip Shawcross
PART I

A. WORD ORDER
B. LOCATION
C. VERB TENSES
D. INSTRUCTIONS, PROCEDURES
E. BASIC SENTENCE STRUCTURE
F. WORD ENDINGS
G. PREFIXES, SUFFIXES
INTRODUCTION

Part One contains the basic aspects of English you will find in almost every line of every technical text. Our objective here is to revise and consolidate your utilization of these parts of the language. Any mistakes are more serious because they cause complete errors of interpretation. You could confuse:

IDENTIFICATION (Module A: WORD ORDER)
if you do not identify the correct word in a group of words.

POSITION (Module B: LOCATION)
if you confuse “upper” and “lower”.

TIME AND USE (Module C: VERB TENSES)
if you mix up “connect”, “is connected”, etc.

ORDERS (Module D: INSTRUCTIONS, PROCEDURES)
if you do not recognize an instruction and know the most common actions like “remove”, “install”, “release”, tighten”, etc.

PARTS OF A SENTENCE (Module E: SENTENCE STRUCTURE)
To find information quickly and correctly you must know how English is constructed.

FUNCTION (Module F: WORD ENDINGS and Module G: PREFIXES, SUFFIXES)
if you do not distinguish between “actuate”, “actuated”, “actuator”, “actuating”, “actuates” and know the significance of the difference; and if you do not distinguish between “upstream” and “downstream”.

These subjects are the easiest, but also the most important. They are explained and you can put them into practice at the end of each module and in the Review (p.48). You will find that we constantly return to them in this book and in the System Maintenance volume, as they are the foundations of technical English.

When you have finished an exercise, check your answers with the Exercise Key.

Remember that it is easier to recognize a point in isolation than in the middle of a long text!
Here are some conventional abbreviations used in this book and in many technical manuals:

<table>
<thead>
<tr>
<th>ABBREVIATION</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>a/c</td>
<td>aircraft</td>
</tr>
<tr>
<td>AD</td>
<td>Airworthiness Directive</td>
</tr>
<tr>
<td>a/l</td>
<td>airline</td>
</tr>
<tr>
<td>AMM</td>
<td>Aircraft Maintenance Manual</td>
</tr>
<tr>
<td>C/B</td>
<td>circuit breaker</td>
</tr>
<tr>
<td>CMM</td>
<td>Component Maintenance Manual</td>
</tr>
<tr>
<td>e.g. (exempli gratia)</td>
<td>for example</td>
</tr>
<tr>
<td>ft</td>
<td>feet</td>
</tr>
<tr>
<td>gal</td>
<td>gallon</td>
</tr>
<tr>
<td>i.e. (id est)</td>
<td>this is, that is to say, in other words</td>
</tr>
<tr>
<td>lb</td>
<td>pound</td>
</tr>
<tr>
<td>lt</td>
<td>light</td>
</tr>
<tr>
<td>m.daN</td>
<td>meter deca Newton</td>
</tr>
<tr>
<td>N.B. (Nota Bene)</td>
<td>take note</td>
</tr>
<tr>
<td>OIT</td>
<td>Operators Information Telex</td>
</tr>
<tr>
<td>oz</td>
<td>ounce</td>
</tr>
<tr>
<td>p.b.</td>
<td>push-button</td>
</tr>
<tr>
<td>p.s.i.</td>
<td>pounds per square inch</td>
</tr>
<tr>
<td>P/N</td>
<td>Part Number</td>
</tr>
<tr>
<td>re</td>
<td>with reference to, refer to</td>
</tr>
<tr>
<td>SB</td>
<td>Service Bulletin</td>
</tr>
<tr>
<td>S/N</td>
<td>Serial Number</td>
</tr>
<tr>
<td>SRM</td>
<td>Structural Repair Manual</td>
</tr>
<tr>
<td>TSM</td>
<td>Trouble Shooting Manual</td>
</tr>
<tr>
<td>TFU</td>
<td>Technical Follow-up</td>
</tr>
<tr>
<td>WDM</td>
<td>Wiring Diagram Manual</td>
</tr>
</tbody>
</table>
WORD ORDER

FLIGHT DECK          AIR CONDITIONING DUCTS
FORWARD GALLEY       WALL PANELS
SEAT UNITS            AVIONICS BAY

PASSENGER DOOR
CABIN FLOOR
NOSE GEAR
CARGO HOLD
ELECTRONIC RACKS
WING LEADING EDGE

FORWARD FUSELAGE
NOTES

The order of words in technical English is very important. Technical English uses a lot of compound words or “noun clusters”, that is a chain of words, e.g.
door lever
fuel tanks
ground servicing operations
left forward passenger door
nose landing gear unlock box
aft cargo compartment door
proximity detector
outer RH flap track fairing
attachment bolt heads

1 THE PRINCIPLE

The basic principle in a compound word is that one word is the component, or “key word”, and the other words are the qualifiers.

<table>
<thead>
<tr>
<th>QUALIFIER</th>
<th>COMPONENT</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>door</td>
<td>lever</td>
<td>lever of the door</td>
</tr>
<tr>
<td>fuel</td>
<td>tanks</td>
<td>tanks for fuel</td>
</tr>
<tr>
<td>upper</td>
<td>deck</td>
<td>deck on the top</td>
</tr>
<tr>
<td>discharge</td>
<td>valve</td>
<td>valve for discharging air, etc.</td>
</tr>
</tbody>
</table>

2 IN A TEXT

When a compound word/expression is in a text (e.g. the Maintenance Manual), the “key word” – the component – is the last word in the chain. The words before qualify the “key word” with more and more specific information:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SYSTEM/ FUNCTION</th>
<th>ASSEMBLY/ FUNCTION</th>
<th>SUB-ASSEMBLY</th>
<th>COMPONENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>left</td>
<td>engine</td>
<td>mounting</td>
<td>bolt</td>
<td>washer</td>
</tr>
<tr>
<td>upper</td>
<td>rudder</td>
<td>servo</td>
<td>drive</td>
<td>rod</td>
</tr>
<tr>
<td>nose</td>
<td>gear</td>
<td>ground</td>
<td>safety</td>
<td>pin</td>
</tr>
</tbody>
</table>

Remember that the “key word” is also the smallest item in the chain. The other words only help to identify it.
IN A LIST

In a text, the "key word" is the last word in the chain. But in a list (an IPL, IPC, etc.), the "key word" is usually the first word – to make identification easier. It is followed by a comma (",") or a dash ("—") then the function, then the location, e.g.

*box*, uplock, nose landing gear
*detector*, proximity, aft cargo component door
*relay*, isolating, starter power

This word order is unusual in a text with a verb.

CONFUSION

Careful! The sense of an expression depends on the word order. Look at these examples. The "key word" is in bold type:

<table>
<thead>
<tr>
<th>brake disc</th>
<th>a disc on the brake unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>disc brake</td>
<td>a type of brake</td>
</tr>
<tr>
<td>flight level</td>
<td>aircraft standard altitude</td>
</tr>
<tr>
<td>level flight</td>
<td>horizontal flight</td>
</tr>
<tr>
<td>tank center</td>
<td>the center of the tank</td>
</tr>
<tr>
<td>center tank</td>
<td>the tank in the wing center box</td>
</tr>
</tbody>
</table>

You must be methodical. Analyse the context. Your interpretation must be coherent. Don’t translate too literally. Find the reality of the aircraft behind the text.

SOME MORE EXAMPLES

- low pressure warning **switch**
- The *aileron supply shutoff valve* is a component of the *aileron system modular unit*.
- The *aft flap assembly* is a monospar structure and consists of the *spar nose ribs* and a machine-tapered *honeycomb trailing edge*.
- The *continuous loop sensing element* consists of an inconel tube filled with a ceramic core.
- MLG shock strut servicing **chart**
- *generator breaker light*
- *exhaust gas temperature thermocouple probe*
- The basic purpose of the combined *pack temperature and cabin temperature regulation system* is to control the amount of *hot trim air* mixed with *cold pack discharge air*. 
**EXERCISES**

You can now put this into practice. When you finish this exercise (and any exercise in the book), check your answers in the Exercise Key.

Choose the compound expression which agrees with the definition. Look at the example. The right answer is A: “SEAT BACK”.

<table>
<thead>
<tr>
<th>DEFINITION</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>back of the seat</td>
<td>SEAT BACK</td>
<td>BACK SEAT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEFINITION</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. air used to cool hot air</td>
<td>AIR COOLING</td>
<td>COOLING AIR</td>
</tr>
<tr>
<td>2. to transfer from one circuit to another</td>
<td>SWITCHING CIRCUIT</td>
<td>CIRCUIT SWITCHING</td>
</tr>
<tr>
<td>3. procedure to check lights</td>
<td>LIGHT TEST</td>
<td>TEST LIGHT</td>
</tr>
<tr>
<td>4. signal sent back by the system</td>
<td>FEEDBACK SYSTEM</td>
<td>SYSTEM FEEDBACK</td>
</tr>
<tr>
<td>5. large groups (looms) of wires</td>
<td>WIRE LOOMS</td>
<td>LOOM WIRES</td>
</tr>
<tr>
<td>6. non-return valve</td>
<td>CHECK VALVE</td>
<td>VALVE CHECK</td>
</tr>
<tr>
<td>7. motor to move a valve</td>
<td>VALVE DRIVE</td>
<td>DRIVE VALVE</td>
</tr>
<tr>
<td>8. activates a valve electrically</td>
<td>SOLENOID VALVE</td>
<td>VALVE SOLENOID</td>
</tr>
<tr>
<td>9. air from engine compressor</td>
<td>BLEED AIR</td>
<td>AIR BLEED</td>
</tr>
<tr>
<td>10. system that provides hot air</td>
<td>AIR BLEED</td>
<td>BLEED AIR</td>
</tr>
</tbody>
</table>

Here are some common aircraft components in the incorrect order. Put them in the correct order. Look at the example:

Incorrect order: COLUMN CAPTAIN CONTROL
Correct order: CAPTAIN CONTROL COLUMN

1. HANDLE CONTROL SPOILER

2. SYSTEM OXYGEN CREW FLIGHT
3. UNIT DISPLAY LOWER

4. BULKHEAD AFT PRESSURE

5. PANEL LIGHTING EXTERIOR CONTROL

6. WING LEFT FAIRING HAND TIP

7. EDGE RIGHT TRAILING UPPER

8. FUEL INTEGRAL TANK

9. RECLINE BUTTON CONTROL

10. DOOR CARGO FITTINGS LOCK

11. DISTRIBUTION CABIN CONDITIONED SYSTEM AIR AFT

12. MAIN DOORS GEAR

13. MARKER LIGHT INNER

14. BOX GEAR NOSE INTERPHONE

15. RECEPTACLE GROUND DOOR ACCESS POWER
EXERCISES

1

Use these words or groups of words to complete this page. The first or the last letter is given.

BETWEEN    UP    REAR    OUTER    OUT OF
THROUGH    IN    RIGHT    NEAR    OFF
OVER    ON    TOP    LEFT    CORNER
CENTER    IN FRONT OF    DOWN    ALONG    BOTTOM
FROM    AROUND    INNER    WITHIN    BEYOND
INTO    TO    LOWER    AFT    BEHIND
UNDER    AT    FORWARD    NEXT TO    UPPER

1. I
2. N
3. A
4. O
5. O O
6. G
7. I F
8. B
9. P
10. N
11. D
12. N
13. R
14. N T
15. F
16. T
17. R
18. U
19. M
20. T

... LONDON ... NEW YORK
Fill in the blanks with the location words. (INTO & BETWEEN are used twice.)

RIGHT  AROUND  THROUGH  TOP  
FROM  UPPER  BETWEEN  NEXT TO  
BEYOND  FROM...TO  FRONT  INTO  
WITHIN  OVER  REAR  ON  
INNER  INTO  AFT  
ALONG  BETWEEN  OUT OF

1. Engine No. 2 is the _______________ engine.
2. Slat N°1 is the _______________ slat.
3. The solenoid valve is mounted _______________ the pump.
4. The cabin is _______________ the hold.
5. Insert the motor _______________ the casing.
6. The cabin lights run _______________ the ceiling.
7. The plate runs _______________ frame 32 _______________ frame 57.
8. The tanks are located _______________ ribs 1 and 14.
9. The Purser station is at the _______________ of the cabin.
10. The center pedestal is _______________ the pilot stations.
11. The First Officer is _______________ the Captain.
12. The insulator is _______________ the wire.
13. The cable passes _______________ the cut-out.
14. The indication is .......... tolerance. (OK)

15. The pointer is .......... the red index! (FAULT)

VERB TENSES

NOTES

In technical documents the number of tenses used is very limited. All these tenses are direct variants of the basic form of the verb: the INFINITIVE. Most technical verbs are regular.

<table>
<thead>
<tr>
<th>PRESENT SIMPLE</th>
<th>IMPERATIVE</th>
<th>GERUND</th>
<th>PAST</th>
<th>FUTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>connects</td>
<td>connect</td>
<td>connecting</td>
<td>connected</td>
<td>will connect</td>
</tr>
<tr>
<td>connect</td>
<td></td>
<td></td>
<td></td>
<td>shall connect</td>
</tr>
</tbody>
</table>

1

THE INFINITIVE

“To” + the basic form of the verb. In technical language it is used to express an action that is an objective, a reason or a purpose:
The lever is used to extend the flaps.
There is a knob to set the altitude.
To open the circuit, pull the circuit breaker.
(See also Module J: PURPOSE.)

2

THE PRESENT SIMPLE

This is the essential tense of technical English and is the basic tense of all technical documentation. It is mainly used in the 3rd person singular (“it”) or 3rd person plural (“they”):
The light illuminates at 45 p.s.i. (singular)
The lights illuminate at 45 p.s.i. (plural)
The present simple is used to describe all generalities, systems, processes, repetitive phenomena, laws, etc:
Air temperature decreases at high altitude.
The AC generator supplies 115 V current.
The cables transmit the order to the servocontrol.
The equipment overheats in hot weather.
Water boils at 100°C.

3 TO BE, TO HAVE

The verbs to be and to have are common.

*To be* indicates a state or condition:
The landing gear lever is at “down”. (singular)
The probes are on the forward fuselage. (plural)

*It is often followed by the past participle:*
The window is cracked.
The valves are closed.

*or by an adjective:*
The seal is new.

*To have* indicates a possession or attribute:
The propeller has four blades. (singular)
The rotary selectors have five positions. (plural)

(See also Module P for TO BE and the PASSIVE.)
N.B. Do not confuse the present continuous, e.g. “The aircraft is taking off” (= now, at this moment) with the present simple: e.g. “The aircraft takes off after VR” (= in general, in all conditions).

4 THE IMPERATIVE

The imperative has the same form as the infinitive but without “to”, e.g. “rotate”, “disconect”, “set”, “check”, “touch”:

Set the selector to IGN A+B.
In the negative form, it is preceded by “do not”:
\[ \text{Do not touch hot brakes.} \]

It is the simplest form of the verb. It is used for all instructions, procedures, checklists, etc.

(See also Module D: INSTRUCTIONS, PROCEDURES.)

**THE GERUND**

The gerund is the basic form of the verb + “ING”, e.g.
\[ \text{locking switching landing testing} \]

It expresses a function or an activity.
It can be the subject of a sentence. e.g.
\[ \text{Smoking is forbidden.} \]

\[ \text{Downlocking is indicated on the gear panel.} \]
\[ \text{Setting the switch to “off” closes the valve.} \]

The gerund (or present participle) can also qualify a word.
It indicates its function, e.g.
\[ \text{cooling unit} \]
\[ \text{retaining ring} \]
\[ \text{uncoupling solenoid} \]

(See also Module F: WORD ENDINGS.)
THE PAST PARTICIPLE

The past participle of regular verbs is the basic form of the verb + “ED” (just “D” when a verb ends in “E” and, if the last consonant is preceded by a vowel, the consonant is usually doubled):

tested checked selected timed transmitted

(See also Module F: WORD ENDINGS.)

Most technical verbs are regular, but here are some common irregular past participles:

<table>
<thead>
<tr>
<th>INFINITIVE</th>
<th>PAST PART.</th>
<th>INFINITIVE</th>
<th>PAST PART.</th>
</tr>
</thead>
<tbody>
<tr>
<td>be</td>
<td>been</td>
<td>meet</td>
<td>met</td>
</tr>
<tr>
<td>do</td>
<td>done</td>
<td>override</td>
<td>overridden</td>
</tr>
<tr>
<td>draw</td>
<td>drawn</td>
<td>read</td>
<td>read</td>
</tr>
<tr>
<td>drive</td>
<td>driven</td>
<td>send</td>
<td>sent</td>
</tr>
<tr>
<td>feel</td>
<td>felt</td>
<td>set</td>
<td>set</td>
</tr>
<tr>
<td>fly</td>
<td>flown</td>
<td>shut</td>
<td>shut</td>
</tr>
<tr>
<td>hang</td>
<td>hung</td>
<td>stick</td>
<td>stuck</td>
</tr>
<tr>
<td>go</td>
<td>gone</td>
<td>tear</td>
<td>torn</td>
</tr>
<tr>
<td>have</td>
<td>had</td>
<td>wear</td>
<td>worn</td>
</tr>
<tr>
<td>lose</td>
<td>lost</td>
<td>wind</td>
<td>wound</td>
</tr>
</tbody>
</table>

The past participle indicates a state, a condition, the result of an action, an action done, e.g.

Check LO LEVEL lights. ... Extinguished.
The antenna is located on the vertical stabilizer.
The contactor is operated by the switching logic.
The position is monitored by two magnetic indicators.
The leading edge is damaged.

(See also Module S: STATES, FAILURES, DAMAGE.)

THE FUTURE

The future is simply will (or shall) + the basic form of the verb:

The aircraft will take off at 09.45.

Will can be used for an intention or an action in the future. Shall indicates a necessity, an imperative or regulatory action and is usually used with to be, e.g.
The tanks shall be drained before the first flight of the day.

(See also Module M: POSSIBILITY, PROBABILITY, NECESSITY, CONDITIONS.)
SOME MORE EXAMPLES

– The pack regulates the air temperature to between -7° C and +73° C.
– When the gear reaches its fully extended position, the Piston Rod Locking Fingers come into contact with the Locking Sleeve.
– Add or release dry air or nitrogen to obtain correct dimension “x”.
– Do not loosen valve body until shock strut has been deflated.
– The indicator clip will shear off to indicate that the cartridge should be replaced.
– Setting the switch to “Trip” de-energizes the APU generator field.
– The light will come on when the control moves from the first detent to full up.
– Steering is controlled by a wheel on either side of the flight deck.
VERB TENSES

EXERCISES

Choose the correct form of the verb to fill in the blanks below. Use the INFINITIVE, the PRESENT SIMPLE (with or without "s"), the GERUND or the PAST PARTICIPLE. Look at the example:

The sensor detects (DETECT) the temperature.

1. The oil is (COOL) by a heat exchanger.
2. The DC tie contactor (CONNECT) DC BUS 1 and DC BAT BUS
3. The recorder is used (RECORD) flight data.
4. The EMER EXIT LTswitch (HAVE) three positions.
5. If an overpressure is (DETECT), the valve opens.
6. (OPEN) the Bleed Valve causes one engine to supply both wings.
7. The engine parameters (BE) displayed on the panel.
8. Filter (CLOG) is indicated on the screen.
9. The outflow valve opens (DEPRESSURIZE) the cabin.
10. There (BE) an "audio cancel" push button on the center pedestal.
11. (REMOVE) the safety pin before aircraft departure.
12. The unit is (LOCATE) in the avionics bay.
13. The engine (DRIVE) the generator.
14. The probes (BE) electrically (HEAT)
15. Generator (OVERLOAD) causes load shedding.
16. (OPEN) the door (HAVE) access to the refuel/defuel coupling.
17. During the flight the escape slide is .................................. (ARM).

18. Flap .................................. (JAM) triggers a warning.

19. .................................. (USE) lockwire .................................. (SECURE) the fastener.

20. If the tire is .................................. (WEAR), .................................. (REMOVE) it.

21. The $\alpha$-Probe .................................. (SENSE) the angle of attack.

22. .................................. (PULL) the Fire Handle .................................. (SHUT) down the engine.

23. The doors are .................................. (CLOSE) and .................................. (LOCK).

24. The Go-Around lever$\ddagger$ .................................. (TRIGGER) full thrust.

25. The line .................................. (BE) maintained by a clamp.

26. The pump .................................. (DELIVER) 80 l. a minute.

27. The fittings .................................. (BE) bolted to the pylon.

28. Propeller .................................. (FEATHER) is automatic in the event of engine failure.

29. The amber warning is .................................. (TRIGGER) by an overheat.

30. A short circuit .................................. (TRIP) the circuit breaker.
INSTRUCTIONS, PROCEDURES

VENT SURGE TANK

FUEL PIPING

WING TIP

RIBS

FRONT SPAR

STATIC DISCHARGERS

REAR SPAR

ALL SPEED AILERON

TRAILING EDGE FLAPS

FLAP TRACK FAIRINGS

WING
Checklists, job-cards, test procedures, removal/installation procedures, etc. are the simplest types of technical documents. The sentences are short. One sentence corresponds to one action or "step". Generally, only the IMPERATIVE is used.

(See also Module C: VERB TENSES.)
The first word is the instruction or action you do. Then the element, component, equipment, etc. concerned, e.g.

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>COMPONENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>de-energize</td>
<td>(the)* aircraft electrical network</td>
</tr>
<tr>
<td>disconnect</td>
<td>electrical ground power unit</td>
</tr>
<tr>
<td>close</td>
<td>refuel/defuel panel access door</td>
</tr>
<tr>
<td>remove</td>
<td>refueling hose</td>
</tr>
<tr>
<td>install</td>
<td>caps on coupling</td>
</tr>
<tr>
<td>remove</td>
<td>access platform</td>
</tr>
</tbody>
</table>

*Often the articles "the" and "a" are not used.

In checklists, etc. the result of the action or the state of the system is indicated. Usually a past participle indicates the result or state (verb + "ED"):

<table>
<thead>
<tr>
<th>INSTRUCTION</th>
<th>COMPONENT</th>
<th>RESULT, STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ensure</td>
<td>engine instruments*</td>
<td>stabilized</td>
</tr>
<tr>
<td>check</td>
<td>CSD PRESS Light*</td>
<td>extinguished</td>
</tr>
<tr>
<td>set</td>
<td>engine ignition</td>
<td>as required</td>
</tr>
<tr>
<td>make sure</td>
<td>pack valve*</td>
<td>closed</td>
</tr>
</tbody>
</table>

*Often the words "is" and "are" are not used.

Here are some actions often made in checks, etc.

<table>
<thead>
<tr>
<th>ACTION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>adjust</td>
<td>regulate</td>
</tr>
<tr>
<td>carry out</td>
<td>do, perform, execute</td>
</tr>
<tr>
<td>check</td>
<td>verify</td>
</tr>
<tr>
<td>control</td>
<td>command</td>
</tr>
<tr>
<td>ACTION</td>
<td>MEANING</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>de-energize</td>
<td>disconnect electrical power</td>
</tr>
<tr>
<td>decrease</td>
<td>make smaller, reduce</td>
</tr>
<tr>
<td>depress</td>
<td>press (≠ depressurize)</td>
</tr>
<tr>
<td>ensure</td>
<td>make sure, check</td>
</tr>
<tr>
<td>increase</td>
<td>make bigger, raise</td>
</tr>
<tr>
<td>monitor</td>
<td>follow, look at parameters</td>
</tr>
<tr>
<td>observe</td>
<td>look, watch, respect</td>
</tr>
<tr>
<td>perform</td>
<td>do, execute, carry out</td>
</tr>
<tr>
<td>press</td>
<td>push, depress</td>
</tr>
<tr>
<td>record</td>
<td>register, note, memorize</td>
</tr>
<tr>
<td>release</td>
<td>remove pressure, free</td>
</tr>
<tr>
<td>remove</td>
<td>take away</td>
</tr>
<tr>
<td>set</td>
<td>position, place, select</td>
</tr>
</tbody>
</table>
Choose the correct verb for each instruction in the procedures listed.

**Instructions 1-6:**
INSTALL TIGHTEN CLOSE RELEASE OPEN REMOVE

1. ........................................ the access panel.
2. ........................................ the four fasteners.
3. ........................................ the faulty unit.
4. ........................................ a new unit.
5. ........................................ the four fasteners.
6. ........................................ the access door.

**Instructions 7-12:**
UNLOCK REMOVE (x2) PLACE RAISE UNTIGHTEN DISCONNECT

7. ........................................ the jack under the shock absorber.
8. ........................................ the nut.
9. ........................................ the jack.
10. ........................................ and ........................................ the nut.
11. ........................................ the electrical wiring.
12. ........................................ the wheel.

**Instructions 13-17:**
PRESS OBSERVE SET RELEASE RESET

13. ........................................ the rotary selector to “A”.
14. ........................................ the push-button.
15. ........................................ the blue light illuminates.
16. ........................................ the push-button.
17. ........................................ the rotary selector to “NORM”.
Instructions 18-23:
DEPRESS CHECK RECORD ENSURE SET MONITOR

18. ................. covers are removed.

19. ................. oil level.

20. .................. master switch to ON.

21. .................. START push-button.

22. .................. indications.

23. ................. any anomalies.
It is important to identify the different parts of a technical sentence. Basically, they are: the SUBJECT, the VERB, the OBJECT, the MEANS and the PURPOSE (the PURPOSE = objective, aim, reason, goal, target...), e.g.

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>VERB</th>
<th>OBJECT</th>
<th>MEANS</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The delta P switch</td>
<td>transmits</td>
<td>a signal</td>
<td>via the ECB</td>
<td>to shut down the APU.</td>
</tr>
<tr>
<td>The hot air</td>
<td>supplies</td>
<td>the slats</td>
<td>through the manifold</td>
<td>for leading edge de-icing.</td>
</tr>
</tbody>
</table>

In general, a “classical” sentence in English follows this structure: SUBJECT – VERB – OBJECT – MEANS – PURPOSE. Often the PASSIVE is used (see Module P: ACTIVE/PASSIVE). In the passive, the sentences above become:

A signal is transmitted by the delta P switch, via the ECB, to shut down the APU.
The slats are supplied with hot air through the manifold for leading edge de-icing.

But there is a tendency to use “classical”, active, sentence structures more and more (see Module X: SIMPLIFIED ENGLISH).

When you read a sentence, identify the different parts. Some sentences do not have all these parts. With our original sentence we can make other simpler sentences.

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>VERB</th>
<th>OBJECT</th>
<th>MEANS/PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The delta P switch</td>
<td>transmits</td>
<td>a signal</td>
<td></td>
</tr>
<tr>
<td>A signal</td>
<td>shuts down</td>
<td>the APU</td>
<td>to shut down the APU.</td>
</tr>
<tr>
<td>The delta P switch</td>
<td>transmits</td>
<td>a signal</td>
<td></td>
</tr>
<tr>
<td>The delta P switch</td>
<td>transmits</td>
<td>a signal</td>
<td>via the ECB.</td>
</tr>
</tbody>
</table>

For more examples of sentence structure, see Modules J (PURPOSE), O (MOVEMENT), Q (PROCESSES) and U (INSTALLATION).
EXERCISES

Use the examples in the notes to identify the subject, verb, object, means or purpose in the five sentences below.

1. The forward mount comprises four attach bolts.
   SUBJECT ..................................................
   VERB ..................................................
   OBJECT ..................................................

2. The actuator assembly has two electrical DC motors.
   SUBJECT ..................................................
   VERB ..................................................
   OBJECT ..................................................

3. The aircraft attitude is indicated by a sphere.
   SUBJECT ..................................................
   VERB ..................................................
   MEANS ..................................................

4. Do not touch the hot parts to prevent burns.
   VERB ..................................................
   OBJECT ..................................................
   REASON ..................................................

5. This S/B recommends the installation of shims to improve fatigue life.
   SUBJECT ..................................................
   VERB ..................................................
   PURPOSE ...............................................
Identify the part of the sentence which is in bold type, as in the examples:

- Two push-buttons enable selection of the ALT ACQ modes.
  "Two push-buttons" = the subject.
- The piping is attached by two clamps in order to avoid vibration.
  "In order to avoid vibration" = the purpose or reason.

1. Each ground spoiler is positioned under hydraulic pressure.

2. Restrictors are installed to limit the terminal velocity.

3. The pitch control channel contains the computing circuitry for receiving data from the aircraft sensors.

4. Additional extension actuates the valve.

5. Heat from a broken duct can damage airplane structure.

Identify the parts of the paragraph below which are in bold type.

Extension and retraction of the nose gear is controlled (1) by the selector valve, and (2) occurs simultaneously with the operation of the main gear. (3) An actuator is pressurized (4) to raise and to lower the nose gear. The actuator acts directly (5) on the nose gear trunnion. A small actuator operates (6) to lock and to unlock the nose gear. A bypass valve linked to the nose gear lock mechanism (7) prevents hydraulic pressure from reaching the nose gear actuator before the gear unlocks. A cutout valve is incorporated (8) to cut off the steering system hydraulic pressure when the nose gear is retracted. (9) Nose gear doors are operated mechanically by gear retraction and extension movements (10) through a cable system.

1. ...................................................... 6. ......................................................
2. ...................................................... 7. ......................................................
3. ...................................................... 8. ......................................................
4. ...................................................... 9. ......................................................
5. ...................................................... 10. ......................................................
The parts of these sentences are in the incorrect order. Put them into the correct order as in the example:

is moved to the up position/to retract the gear/the control handle
The control handle is moved to the up position to retract the gear.
or
To retract the gear, the control handle is moved to the up position.

1. are connected/to the steering cables/the rudder pedals

2. 3000 psi hydraulic fluid/the metering valve/to the actuator/directs

3. is/the compressor section/the source of compressed air

4. entering the system/to prevent oil/seals/are installed

5. a signal/the sensor/to turn on the red warning/provides

6. controls/to dampen yaw axis movement/the yaw damper system/the rudder

7. by two pumps/system pressure/is supplied

8. two pumps/system pressure/supply

9. the push-button/the system/resets/pushing

10. the valve/opens and closes/to control the fuel flow/an electrical motor
Try to put these different parts of a sentence into the correct order, as in the example.

transmit/to the monitoring unit/the two pressure transducers/the signals

The two pressure transducers transmit the signals to the monitoring unit.

Don't forget to check your answers with the Exercise Key.

1. the bleed air temperature/a precooler/controls

2. the autobrake system/pushing LO, MED or MAX/arms

3. to the seat tracks/with two fasteners/the seat unit/an attachment fitting/attaches

4. of several transmitters/inhibits/an electronic device/the simultaneous selection

5. the 115 V-400 Hz current/the exciters/to enable ignition/into high voltage, pulsating current/transform

6. to control the aircraft/ the main information/presents/the screen

7. from the engine HP compressor/by a heat exchange process/cools/the precooler/the hot air

8. to open the valve/necessary/a minimum upstream pressure of 8 psig/is

9. comprise/ extending from frame 1 to frame 24/the lower section of the fuselage/3 skin panels

10. with the screw the washer and the nut/the bolt/install
11. to drive the valve/if the other motor does not operate/permits/the gear system/one motor

12. indicate/two green lines/that the protection is available/inside the speed scale

13. the air pressure an anti-ice valve/controls/at the required value

14. the position/two switches/according to a logic/give

15. under spring pressure/the poppet valve/on to the valve seat/moves

There is no punctuation in this paragraph. Read it and decide where the sentences are. Add the punctuation and capital letters, then compare your version with the original in the Key.

HYDRAULIC POWER TRANSFER UNIT
FIGURE 003

the filter bowl screws on to the flanged mounting it contains the filter element and holds it against the mounting a seal prevents leakage the bowl is screwed tight by means of a square tightening lug on the bottom surface the filter element has a support tube with a spigot which opens the inner valve when the filter element is fitted filter power of the element is 15 microns 0.0006 in. the red clogging indicator is protected by a transparent cap which is integral with the mounting the indicator becomes visible when any filter clogging causes pressure to drop to 6 bars 87 psi

All the words in these 10 sentences are stuck together. Detach them, as in the example, in order to find the meaning of the sentences.

The surge-vent tank is designed to absorb the effect of fuel surges.
The surge-vent tank is designed to absorb the effect of fuel surges.

1. The gear can extend by free fall.
2. The overhead racks are mounted on the ceiling.

3. There is an interface between the fire detection system and the master warning controller.

4. Disconnect the return line from the cased rain hose.

5. Any drop in voltage is detected by the voltage monitor.

6. The ATC transponder is electrically supplied but not operating.

7. Check that the doors are flush with the fuselage skin.

8. The amber magnetic indicator shows the valve is in transit.

9. The ground spoilers are armed before landing.

10. The aircraft symbol is slaved to a computer.
Always look at the end of a word. It can give you information about the function of the word:

heat heater heating heated heats
sense sensor sensing sensed senses

So, the ending (-er, -or, -ing, -ed, -s, -es) transforms the sense of the basic word.

1. **-ER, -OR**

The ending -er and -or indicate a component, agent or assembly which does an action or function:

<table>
<thead>
<tr>
<th>WORD</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>heater</td>
<td>a component which heats</td>
</tr>
<tr>
<td>sensor</td>
<td>a component which senses, detects</td>
</tr>
<tr>
<td>handler</td>
<td>an agent who handles, manipulates</td>
</tr>
<tr>
<td>mixer</td>
<td>an assembly which mixes</td>
</tr>
<tr>
<td>damper</td>
<td>a part which damps, absorbs</td>
</tr>
</tbody>
</table>

2. **-ING**

The ending -ing indicates an action (see Module C: THE GERUND) or a function:

<table>
<thead>
<tr>
<th>WORD</th>
<th>ACTION/FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>heating</td>
<td>the action of increasing temperature</td>
</tr>
<tr>
<td>sensing</td>
<td>the function of detection</td>
</tr>
<tr>
<td>smoking</td>
<td>the action of making smoke, fumes</td>
</tr>
<tr>
<td>leading</td>
<td>to lead, to be in front</td>
</tr>
<tr>
<td>braking</td>
<td>the action of using the brakes</td>
</tr>
</tbody>
</table>
Many gerunds or present participles (ending in -ing) are used in compound words.

The -ing word indicates the function, the action or the condition of the other word, e.g. cooling unit (function), sliding piston (action), operating speed (condition)

-ED

The ending -ed is the ending of the regular simple past or regular past participle. When it is a participle, it often indicates a state or an action done and follows the verb to be:

<table>
<thead>
<tr>
<th>WORD</th>
<th>SENTENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>heated</td>
<td>The probes are heated in flight.</td>
</tr>
<tr>
<td>sensed</td>
<td>Air overheat is sensed by the detector.</td>
</tr>
<tr>
<td>energized</td>
<td>The aircraft is energized for ground tests.</td>
</tr>
<tr>
<td>deflected</td>
<td>The stabilizer is deflected 2° up.</td>
</tr>
<tr>
<td>tested</td>
<td>The box is tested every 50 hours.</td>
</tr>
</tbody>
</table>

(For some irregular past participles see Module C.)

-S, -ES

The endings -s, -es at the end of a word can indicate different things:

A. THE PLURAL

<table>
<thead>
<tr>
<th>SINGULAR</th>
<th>PLURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>control</td>
<td>controls</td>
</tr>
<tr>
<td>switch</td>
<td>switches</td>
</tr>
<tr>
<td>assembly</td>
<td>assemblies</td>
</tr>
<tr>
<td>speed</td>
<td>speeds</td>
</tr>
</tbody>
</table>

N. B. In compound words only the last word, the "key word", is variable, i.e. singular or plural. e.g.

A three seat unit (not a three seats unit)

A gear microswitch installation (not a gear microswitches installation)
B. THE THIRD PERSON SINGULAR ("It" – see Module C: THE PRESENT SIMPLE)

<table>
<thead>
<tr>
<th>VERB</th>
<th>THIRD PERSON SINGULAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>heat</td>
<td>heats</td>
</tr>
<tr>
<td>sense</td>
<td>senses</td>
</tr>
<tr>
<td>transmit</td>
<td>transmits</td>
</tr>
<tr>
<td>press</td>
<td>presses</td>
</tr>
</tbody>
</table>

N B. Many words are substantives and verbs. The "s" can indicate either a plural or the third person singular, e.g.

ATA Chapter 27 is the Flight Controls.
The trim wheel controls the Stabilizer.

There are two master switches on the engine panel.
The pilot switches from one frequency to the other.

C. THE POSSESSIVE (’s and -s’ indicate the possessive)

the flight’s destination = the destination of the flight (singular)
the pilots’ seats = the seats of the pilots (plural)

5 SOME MORE EXAMPLES

- All exterior lights are operated from a single Exterior Lighting control panel located in the center of the overhead panel.
- The APU engine exhaust gas temperature indicating system consists of a thermocouple probe connected to an indicator and operates on self-generated power.
- Flushing of the brake system is accomplished by connecting a ground hydraulic cart to the airplane so as to make a closed circuit.
- The pilots’ sun visors are hinged to the upper windshield frame.
- The lavatory fire extinguishing system is a fixed system providing fire extinguishing capability to the lavatory compartment.
- The test fail logic and light are tested by pressing the lamp test button. While the button is pressed, switch S8 opens and forces the output of gate 14 to go to a logic one.
- The rate Gyro is the sensing element of the yaw damper coupler which is used to detect any yawing motion.
- When the landing gear is extended the valve remains blocked until the aircraft touches the ground.
Write the form of the word which agrees with the definition. The basic word is in brackets () if it is different from the definition, as in the example:

DEFINITION
the function of verification (CHECK)
a device which loads

YOU WRITE
checking
a loader

1. A device which ignites
2. A part which restricts
3. A microswitch ..... a signal
to the working unit (SEND)
4. The function of a loader
5. It stabilizes the pitch axis
6. A lever that rocks
7. Ready for use (ARM)
8. A light used when the a/c lands
9. A machine that prints
10. When the gear is up and (LOCK)
11. OFF or (EXTINGUISH)
12. Nosewheel (STEER)
13. The rear edge of the wing (TRAIL)
14. To de-ice: the function
15. The papers of the flight crew
16. A bottle to extinguish fires
17. A cover/cap/plug that blanks
18. The names of the passengers
19. When the flaps are down (EXTEND)
20. It reverses the direction of thrust
Many prefixes are common to all languages based on Latin, e.g. anti-, co-, de-, hyper-, in-, inter-, post-, pre-, re-, trans-, etc. They modify the sense of the word.

Some prefixes and suffixes are specifically English. Here are some frequently used in technical English: Often they are “location” words. (See Module B.)

<table>
<thead>
<tr>
<th>PREFIX/ SUFFIX</th>
<th>MEANING</th>
<th>EXAMPLE WORD</th>
<th>DEFINITION OF WORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>around</td>
<td>180°/360°</td>
<td>turnaround</td>
<td>between arrival and departure</td>
</tr>
<tr>
<td></td>
<td>return</td>
<td>feedback</td>
<td>return of data</td>
</tr>
<tr>
<td></td>
<td>behind</td>
<td>pushback</td>
<td>push a/c from gate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>background</td>
<td>area behind, past experience</td>
</tr>
<tr>
<td></td>
<td></td>
<td>blowback</td>
<td>pushed by air (slats)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turnback</td>
<td>a/c returns to departure</td>
</tr>
<tr>
<td>back</td>
<td>return</td>
<td>feedback</td>
<td>return of data</td>
</tr>
<tr>
<td></td>
<td>behind</td>
<td>pushback</td>
<td>push a/c from gate</td>
</tr>
<tr>
<td></td>
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<td>background</td>
<td>area behind, past experience</td>
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<td></td>
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<td>blowback</td>
<td>pushed by air (slats)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turnback</td>
<td>a/c returns to departure</td>
</tr>
<tr>
<td>by</td>
<td>next to</td>
<td>bypass</td>
<td>avoid, go round</td>
</tr>
<tr>
<td></td>
<td></td>
<td>standby</td>
<td>alternative, ready for use</td>
</tr>
<tr>
<td>counter</td>
<td>contrary, opposite</td>
<td>counterclockwise</td>
<td>in direction contrary to movement of clock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>counterorder</td>
<td>contrary command</td>
</tr>
<tr>
<td></td>
<td></td>
<td>counterrotating</td>
<td>turning in different directions</td>
</tr>
<tr>
<td>cross</td>
<td>exchange, from side to side</td>
<td>crossbeam</td>
<td>transversal floor structure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>crosswind</td>
<td>wind 90° to a/c</td>
</tr>
<tr>
<td></td>
<td></td>
<td>crossfeed</td>
<td>supply one side from the other</td>
</tr>
<tr>
<td></td>
<td></td>
<td>crosscheck</td>
<td>compare 2 instruments</td>
</tr>
<tr>
<td></td>
<td></td>
<td>disconnect</td>
<td>terminate connection</td>
</tr>
<tr>
<td>PREFIX/SUFFIX</td>
<td>MEANING</td>
<td>EXAMPLE WORD</td>
<td>DEFINITION OF WORD</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------</td>
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<td>---------------------------------------------------------</td>
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<tr>
<td>dis</td>
<td>descent, descent, bottom,</td>
<td>disagree</td>
<td>non-conformity</td>
</tr>
<tr>
<td></td>
<td>lower</td>
<td>down</td>
<td>time a/c not operational</td>
</tr>
<tr>
<td></td>
<td></td>
<td>downtime</td>
<td>fix landing gear extended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>downlock</td>
<td>moment wheels touch runway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>touchdown</td>
<td>data transmission to ground</td>
</tr>
<tr>
<td></td>
<td></td>
<td>downlink</td>
<td>lower point in a flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>downstream</td>
<td></td>
</tr>
<tr>
<td>fore</td>
<td>forward, in front of entry,</td>
<td>foreflap</td>
<td>front section of flap</td>
</tr>
<tr>
<td></td>
<td>≠ out, interior</td>
<td>forecast</td>
<td>estimation</td>
</tr>
<tr>
<td>in</td>
<td>entry, entry, ≠ out,</td>
<td>inlet</td>
<td>electronic, electrical, command, signal received</td>
</tr>
<tr>
<td></td>
<td>interior</td>
<td>intake</td>
<td>entry for fluids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>inboard</td>
<td>entry of air on engine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>midspan</td>
<td>inner, inside, internal</td>
</tr>
<tr>
<td>mid</td>
<td>middle</td>
<td>misadjusted</td>
<td>in the middle of wing, blade, etc.</td>
</tr>
<tr>
<td>mis</td>
<td>badly, incorrectly</td>
<td>misfit</td>
<td>incorrectly regulated</td>
</tr>
<tr>
<td></td>
<td>incorrectly</td>
<td>misaligned</td>
<td>improperly installed</td>
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<td>mismatch</td>
<td>incorrectly aligned</td>
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<tr>
<td></td>
<td></td>
<td>offset</td>
<td>not corresponding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>offload</td>
<td>not in center</td>
</tr>
<tr>
<td></td>
<td></td>
<td>take off</td>
<td>remove load = unload</td>
</tr>
<tr>
<td></td>
<td></td>
<td>turn off</td>
<td>a/c leaves the ground</td>
</tr>
<tr>
<td></td>
<td></td>
<td>shutoff</td>
<td>turn and leave runway</td>
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<tr>
<td></td>
<td></td>
<td>onload</td>
<td>stop</td>
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<tr>
<td></td>
<td></td>
<td>on-line</td>
<td>put on board</td>
</tr>
<tr>
<td>on</td>
<td>in contact, operating</td>
<td>on-load</td>
<td>directly connected to computer</td>
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<tr>
<td></td>
<td>operating</td>
<td>on-line</td>
<td>outer, external</td>
</tr>
<tr>
<td></td>
<td></td>
<td>outboard</td>
<td>electronic, electrical, command</td>
</tr>
<tr>
<td></td>
<td></td>
<td>output</td>
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<td></td>
<td></td>
<td>outlet</td>
<td>exit for fluids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>outflow</td>
<td>exit for fluids</td>
</tr>
<tr>
<td>PREFIX/SUFFIX</td>
<td>MEANING</td>
<td>EXAMPLE WORD</td>
<td>DEFINITION OF WORD</td>
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<tr>
<td><strong>out</strong></td>
<td></td>
<td>cut out</td>
<td>de-activate</td>
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<td></td>
<td></td>
<td>rollout</td>
<td>deceleration on landing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>readout</td>
<td>display, reading of data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>layout</td>
<td>location, installation</td>
</tr>
<tr>
<td></td>
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<td>overfly</td>
<td>fly on, across, above</td>
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<td></td>
<td>above</td>
<td>overheat</td>
<td>excessive temperature</td>
</tr>
<tr>
<td></td>
<td>in excess, too much,</td>
<td>overload</td>
<td>excessive load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>overlap</td>
<td>one surface partially on another</td>
</tr>
<tr>
<td></td>
<td></td>
<td>overpressure</td>
<td>excessive pressure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>overspeed</td>
<td>excessive speed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>overflow</td>
<td>too full</td>
</tr>
<tr>
<td></td>
<td></td>
<td>override</td>
<td>priority manual order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>takeover</td>
<td>take control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>post flight</td>
<td>after the flight</td>
</tr>
<tr>
<td><strong>post</strong></td>
<td>after</td>
<td>self-contained</td>
<td>autonomous</td>
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<tr>
<td></td>
<td>auto</td>
<td>self-regulating</td>
<td>regulates itself</td>
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<tr>
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<td></td>
<td>self-positioning</td>
<td>positions itself</td>
</tr>
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<td></td>
<td></td>
<td>self-held</td>
<td>maintains itself</td>
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<tr>
<td><strong>side</strong></td>
<td>lateral</td>
<td>sidewall</td>
<td>lateral surface</td>
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<tr>
<td></td>
<td>under</td>
<td>subtask</td>
<td>secondary task</td>
</tr>
<tr>
<td></td>
<td></td>
<td>subassembly</td>
<td>2nd level assembly</td>
</tr>
<tr>
<td></td>
<td>passage</td>
<td>feedthrough</td>
<td>orifice for cables</td>
</tr>
<tr>
<td></td>
<td></td>
<td>throughput</td>
<td>data flow</td>
</tr>
<tr>
<td><strong>sub</strong></td>
<td>under</td>
<td>twin-aisle</td>
<td>2 aisles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>twin-engine</td>
<td>2 engines</td>
</tr>
<tr>
<td><strong>through</strong></td>
<td>passage</td>
<td>uncommanded</td>
<td>not ordered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>unrelated</td>
<td>with no connection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>unlocked</td>
<td>not locked, not fastened</td>
</tr>
<tr>
<td></td>
<td></td>
<td>unsafe</td>
<td>dangerous</td>
</tr>
<tr>
<td></td>
<td>below,</td>
<td>underpressure</td>
<td>insufficient pressure</td>
</tr>
<tr>
<td>PREFIX/SUFFIX</td>
<td>MEANING</td>
<td>EXAMPLE WORD</td>
<td>DEFINITION OF WORD</td>
</tr>
<tr>
<td>---------------</td>
<td>--------------------------------</td>
<td>----------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>under up</td>
<td>too low</td>
<td>undersurface</td>
<td>lower side of wing</td>
</tr>
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<td></td>
<td>ascending, installation,</td>
<td>backup</td>
<td>reserves, alternative</td>
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<tr>
<td></td>
<td>make better</td>
<td>uplock</td>
<td>fix landing gear retracted</td>
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<tr>
<td></td>
<td></td>
<td>pickup</td>
<td>sensor, detector</td>
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<tr>
<td></td>
<td></td>
<td>upstroke</td>
<td>movement up</td>
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<td></td>
<td></td>
<td>upstream</td>
<td>high point in a flow</td>
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<td>uplift</td>
<td>refuel</td>
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<td></td>
<td>update</td>
<td>modify, make current</td>
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<tr>
<td></td>
<td></td>
<td>setup</td>
<td>preparation, installation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>upgrade</td>
<td>raise, improve quality</td>
</tr>
</tbody>
</table>

325119 STEERING FEEDBACK

492351 INLET GUIDE VANE ACTR
EXERCISES

Make compound words with the prefixes/suffixes and the words below to correspond to the definitions. (One of the words and some prefixes and suffixes have to be used twice.) Look at the examples:

- transfer of hot air from one wing to the other – CROSSBLEED
- when aircraft leaves the ground – TAKEOFF

PREFIXES/SUFFIXES

<table>
<thead>
<tr>
<th>UNDER</th>
<th>ON</th>
<th>OVER (2)</th>
<th>UN (2)</th>
<th>CROSS (2)</th>
<th>OUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIS</td>
<td>DOWN (2)</td>
<td>IN (2)</td>
<td>MID</td>
<td>DIS (2)</td>
<td>SELF</td>
</tr>
<tr>
<td>UP (2)</td>
<td>THROUGH</td>
<td>BACK</td>
<td>BY</td>
<td>AROUND</td>
<td>COUNTER</td>
</tr>
</tbody>
</table>

WORDS

<table>
<thead>
<tr>
<th>SAND</th>
<th>RIDE</th>
<th>FEED</th>
<th>AGREE</th>
<th>REGULATING</th>
<th>TURN (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PICK</td>
<td>CONNECT</td>
<td>SET</td>
<td>LET</td>
<td>SPEED</td>
<td>SPAN</td>
</tr>
<tr>
<td>CHECK</td>
<td>ADJUST</td>
<td>LOCKED</td>
<td>TIME</td>
<td>CLOCKWISE</td>
<td>PUT</td>
</tr>
<tr>
<td>PRESSURE</td>
<td>COMMANDED</td>
<td>WIND</td>
<td>BOARD</td>
<td>SAFE</td>
<td>LOAD</td>
</tr>
</tbody>
</table>

1. excessive speed
2. dangerous
3. insufficient pressure
4. electronic signal received
5. in direction contrary to clock
6. entry of air, water etc.
7. to compare two indications
8. not ordered
9. auto-regulating
10. hole in structure to pass cables
11. ready for use
12. sensor, detector
13. to return to point of departure
14. to stop connection
15. external, outer
16. non-conformity
17. regulate badly
18. wind at 90° to a/c axis
19. priority order
20. gear extended and ...?...
21. time between a/c arrival and departure
22. middle of wing, blade etc.
23. preparation for work etc.
24. to place cargo etc. on a/c
25. time a/c or equipment inoperative
# REVIEW ONE

1. Put together (match) the compound expressions below with the definitions or synonyms. Look at the example:

   Temperature of the gas leaving the turbine = EXHAUST GAS TEMPERATURE

<table>
<thead>
<tr>
<th>SERVO-CONTROL</th>
<th>ATTENDANT STATION</th>
<th>CABIN WINDOWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRAKE PEDALS</td>
<td>DOOR HANDLE</td>
<td>FIRE DETECTOR LOOP</td>
</tr>
<tr>
<td>CROSSBLEED VALVE</td>
<td>FUEL PUMP</td>
<td>FAN AIR VALVE</td>
</tr>
<tr>
<td>SEAT RAILS</td>
<td>BLEED AIR</td>
<td>HYDRAULIC RESERVOIR</td>
</tr>
<tr>
<td>VERTICAL SPEED INDICATOR</td>
<td>THROTTLE LEVERS</td>
<td>PROXIMITY DETECTOR</td>
</tr>
<tr>
<td>RAM AIR INLET</td>
<td>FIRE HANDLE</td>
<td>CIRCUIT BREAKER</td>
</tr>
<tr>
<td>PUSH BUTTON</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. They control the engines.
2. You hold this to open the door.
3. The passengers see through these.
4. Skydrol is stored here.
5. The seats are installed on these.
6. Dynamic air enters here.
7. They control the brakes.
8. It displays the rate of climb/descent.
9. It detects a door, etc. closed.
10. It shuts down the engine in an emergency.
11. Above (over) Captain and First Officer.
12. The cabin crew sit here.
13. It senses engine fire.
15. A control that you press.
16. It drives a flight control surface.

17. It creates fuel flow.

18. It transfers air from side to side.

19. It controls air from the fan.

20. Air from engine compressor.

2 Many of the verbs in CAPITALS in the sentences below are in the incorrect tense. If the verb is correct, put a tick (√). If it is incorrect, put a cross (x), then write the correct form on the line, as in the examples:

   The batteries ARE LOCATING in the bay.  
   The gear IS EXTENDED at 1500 ft.  

   are located

1. The packs REGULATE $ the air temperature.

2. The C/B trips FOR PROTECT the circuit.

3. The engines DRIVING the generators.

4. The test bench TESTS the equipment.

5. The drain valves DRAIN $ water from the tank.

6. REMOVING the chocks before push-back.

7. TRIPPING the C/B opens the circuit.

8. The speed IS REGULATING by a governor.

9. MAKE sure the flap travel area is clear.

10. The selector HAVE four positions.

11. TO TORQUE the bolt to the valve indicated.

12. A unit MONITORED the operation.

13. TO SMOKE is forbidden.
14. The tire pressure SHALL BE CHECKED every day.

15. Use the gage TO MEASURE the level.

16. The temperature DETECTS by a sensor.

17. The pump INCREASE the flow.

18. SET the lever to “DOWN” FOR EXTEND the gear.

19. There IS cracks on the frame, so CHECKING it.

20. The gas is RELEASING when the handle is PULLED.

3 On the page opposite there is a cutaway view of the rear fuselage. The descriptions of precise locations correspond to the 20 terms above and below the view. Find the term which agrees with (matches) each location.

1. Mounted on the longerons.

2. Opens outwards and upwards.

3. Under the cabin floor, on tracks, side by side.

4. From one side of the cabin to the other.

5. Installed on the inside of the passenger doors and attached to the door sill during the flight.

6. They run around the fuselage.

7. They run along the cabin between the seat units.

8. Opens inwards and upwards.

9. Faces aft near the pax. door.

10. On the inner skin perpendicular to the frames.

11. In front of the cargo door.

12. 8 seats abreast.

13. Along the top of the fuselage.
14. Opens outwards and forwards.
15. Between the skin and the wall panels.
16. Under the seat rails, at right angles to the cross beams.
17. Over the seats.
18. When down, inside and flush with the door.
20. Two or three next to each other.

ESCAPE SLIDE CONTAINERS CABIN WINDOWS BALL MAT AFT PASSENGER DOOR DOOR HANDLE FRAMES CROSS BEAMS AISLE ATTENDANT SEAT

STRINGERS GLASS WOOL BLANKETS ANTENNA LONGERONS REAR CARGO DOOR OVERHEAD BAGGAGE RACKS SEAT UNIT ROW SEAT RAILS BULK CARGO DOOR
4 Think of all the actions you can do to these components. For example:

KNOB: rotate, turn, set, pull, push, adjust.

1. push-button
2. light
3. fire handle
4. covers
5. circuit breaker
6. brakes
7. rotary selector
8. screw
9. plug
10. throttle levers
11. oil level
12. switch
13. cargo door
14. switch guard
15. seat-belt
16. printed circuit board
17. current
18. jack
19. escape slide
20. control cables
It is important to be able to isolate the most important parts of a sentence. In this example the important parts are in bold type:

This valve controls the cold airflow bled from the fan exhaust which passes through the precooler in order to regulate the temperature of engine compressor bleed air.

In the examples below try to isolate the basic skeleton of the sentence by underlining the SUBJECT, the VERB and the KEY WORD(S).

1. Support arm

The support arm is a cast light alloy box section with integral connection forks. Each connection fork is provided with standardized and replaceable bushes.

The door is attached to the support arm by means of upper and lower connection links.

The lower connection link is also connected to the lifting shaft of the door locking mechanism. An adjustable door buffer attached to the inner face of the support arm acts as a limit stop and shock absorber when the door is fully opened. A door stay mechanism installed in the support arm locks the door in the fully open position. The mechanism comprises a release button, actuating rod and lever, bellcrank, spring-loaded rod and locking hook.

2. If the output voltage of the d-c regulator attempts to rise above 16 vdc, the emitter of Q2202 follows this rise decreasing the conduction through Q2202. The decrease in current through Q2202 results in the base voltage of Q2201 rising, which in turn, decreases the current through Q2201. The result is that the output voltage returns to 16 vdc.

3. General

The air bled from the fifth stage of the compressor passes through four duct sections and a line-mounted valve of the on-off type. At the forward bulkhead of the intake cowl, the anti ice system interfaces with the swirl nozzle in the intake lip. The spent air then enters the cavity of the intake cowl aft of the forward bulkhead. The air passes through holes in the inner cap of the bulkhead between the skin inner barrel and the bulkhead.

Finally, the air exhausts overboard through the flush duct in the outer barrel.

The airflow pressure is controlled by an anti-ice valve which is of the butterfly type and electrically-operated.
Try to put these different parts of a sentence into the correct order. Don't forget to check your answers with the Exercise Key.

1. through the reservoir filling system/the mechanic/to replenish the system/fills/the reservoir

2. stores/the selected track number/a battery-buffer memory/for later use

3. the fuel supply/controls/to the other wing/a crossfeed valve

4. to the cable/with the turnbuckle/the rod/connects/the lever

5. a lever/to open the doors on the ground/a device/controls/without hydraulic power

6. to personnel/must be depressurized/to prevent/the aileron control system/injury

7. provides/to maintain or change attitude, altitude and heading/also/the AFCS/coordinated maneuvering

8. to the retract port/the valve/when the flaps are retracted/pressure/directs/on each actuator

9. the fuel control unit/from foreign material contamination/protects/the L.P. fuel filter

10. the supply/for the system/contains/of oil/the oil tank

11. the seals/in position/and/holds/a retaining ring/to make a pressure-tight joint/the pane
12. 28 VDC/to turn on/a series circuit/through the lower contacts/the red light in the fire handle/applies

13. amber lights/the STAB OUT-OF-TRIM indicators/on the pilot's control panel/are

14. prevents/on the control quadrant/rapid movement/a gate/of the control lever

15. frees/in the event of hydraulic power loss/the elevator control tabs/the tab lock-out mechanism/from both systems A and B

7 Read these texts and complete the missing word-endings with -ED, -OR, -ER, -ING or -S.

1. The wing tank pump___ are locat___ in a collect___ box form___ by root Rib 1 and Rib 2. Rib 2 is seal___ except for vent hole___ at the top and clack valve___ at the bottom through which fuel gravitate___ into the enclosure. Two inward-open___ hing___ panel___ in Rib 2 provide access into this area. This configuration make___ sure that the pump___ are fully in fuel during flight maneuvers. Each pump has an intake pipe fitt___ with a strain___ . A bypass pipe with suction valve enable___ the engine to get fuel by suction if the pump___ do not work.

2. The pump is of the variable-displacement type. The rotat___ assembly turn___ all the time that the engine operate___ . The pump has nine piston___ which are connect___ to a moveable yoke plate. When the angle of the yoke plate change___ , the stroke of the piston___ change___ and the output of the pump is increas___ or decreas___ . The compensat___ valve supplie___ servo pressure to the actuat___ piston, which control___ the angle of the yoke. A solenoid valve (controll___ from the flight compartment) make___ it possible to change the operation of the pump so that it do___ not supply pressure to the system (depressuriz___ mode). The EDP include___ a block___ valve which isolate___ the pump from the hydraulic system when the pump operate___ in the depressuriz___ mode.
3. Each pressure reducer valve includes a control piston which operates a distribution slide valve through a spring R1 and a rocking arm. When the pedal is released, the Yellow pressure at A is shut off and the brake port C is connected to the reservoir return B.

When the pedal is pushed in, the volume of fluid moved by the master cylinder causes the displacement of the piston which then operates the rocking arm and the slide valve; B is shut off and the pressure port A is connected to the brake port C.

When line C is filled, the pressure pushes on the end of the slide valve (chamber D) which, through the rocking arm, causes the spring R1 to compress; the control piston remains in the same position.
PART 2

H. PHYSICAL CHARACTERISTICS
I. DIMENSIONS
J. PURPOSE
K. CONJUNCTIONS
L. ACTIONS
M. POSSIBILITY, PROBABILITY, NECESSITY, CONDITIONS
INTRODUCTION

The 6 modules that comprise Part Two can be divided into three categories:

GENERAL INFORMATION
H. PHYSICAL CHARACTERISTICS
I. DIMENSIONS

IMPORTANT LANGUAGE FUNCTIONS
J. PURPOSE
K. CONJUNCTIONS
M. POSSIBILITY, PROBABILITY, NECESSITY, CONDITIONS

TECHNICAL VOCABULARY
L. ACTIONS

The Language Functions need more time and concentration.

In J, we look at the different ways in which people talk about the objectives, targets, aims, functions of a system, etc.

In K, we try to distinguish between the different “link words”: words that connect the parts of a sentence and introduce cause, effect, comparison, addition, etc. Don't worry. It takes a long time to assimilate them all. Learn them progressively, one at a time, starting with the most common ones.

In M, we use short but important words: “can”, “may”, “must”, “shall”, “need”, “should”, “if”, etc.

As in Part One, work gradually. Do not do all a module before continuing with the next one. Read the explanations. Study the examples. Do one exercise. Then go on to the next module. Come back to the previous module later and do another exercise. Later you will do the Review (p. 98). This is an easier, more effective way of learning. Think how several thin coats of paint are more resistant than one thick coat!
## PHYSICAL CHARACTERISTICS

### NOTES

#### SHAPES: LINES AND OBJECTS

<table>
<thead>
<tr>
<th>Straight</th>
<th>Curved</th>
<th>Undulating, Wavy</th>
<th>Pointed, Sharp</th>
<th>Rounded, Blunt</th>
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</thead>
<tbody>
<tr>
<td>Circular</td>
<td>Rectangular</td>
<td>Square</td>
<td>Triangular</td>
<td>Trapezoidal</td>
</tr>
<tr>
<td>Cylindrical</td>
<td>Spherical</td>
<td>Conical</td>
<td>Tapering</td>
<td>Cubic</td>
</tr>
<tr>
<td>Box Shaped</td>
<td>Elongated, Stretched</td>
<td>Shortened</td>
<td>Flat</td>
<td></td>
</tr>
</tbody>
</table>
2 COLORS

<table>
<thead>
<tr>
<th>THE SPECTRUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>violet mauve</td>
</tr>
<tr>
<td>blue cyan</td>
</tr>
<tr>
<td>green</td>
</tr>
<tr>
<td>yellow amber beige</td>
</tr>
<tr>
<td>orange brown pink</td>
</tr>
<tr>
<td>red magenta</td>
</tr>
<tr>
<td>black</td>
</tr>
<tr>
<td>grey</td>
</tr>
<tr>
<td>white</td>
</tr>
<tr>
<td>dark</td>
</tr>
<tr>
<td>light</td>
</tr>
</tbody>
</table>

3 CHARACTERISTICS

<table>
<thead>
<tr>
<th>SURFACE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>clean</td>
<td>free of dirt</td>
</tr>
<tr>
<td>dirty</td>
<td>contaminated, soiled</td>
</tr>
<tr>
<td>greasy</td>
<td>covered with grease</td>
</tr>
<tr>
<td>matt</td>
<td>surface that does not reflect</td>
</tr>
<tr>
<td>oily</td>
<td>covered with oil</td>
</tr>
<tr>
<td>rough</td>
<td>irregular, abrasive surface</td>
</tr>
<tr>
<td>shiny</td>
<td>surface which reflects</td>
</tr>
<tr>
<td>smooth</td>
<td>regular surface, polished</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INTERNAL</th>
<th>MEANING</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>corrosive</td>
<td>eats into material</td>
<td>acid</td>
</tr>
<tr>
<td>flammable</td>
<td>ignites quickly</td>
<td>fuel</td>
</tr>
<tr>
<td>fragile</td>
<td>breaks easily</td>
<td>glass</td>
</tr>
<tr>
<td>hard</td>
<td>not easily penetrated, rigid</td>
<td>steel</td>
</tr>
<tr>
<td>heavy</td>
<td>great weight</td>
<td>iron</td>
</tr>
<tr>
<td>hollow</td>
<td>empty in the middle</td>
<td>tube</td>
</tr>
<tr>
<td>inert</td>
<td>gas that does not react</td>
<td>nitrogen</td>
</tr>
<tr>
<td>light</td>
<td>small weight</td>
<td>foil</td>
</tr>
</tbody>
</table>
This page intentionally left blank
PHYSICAL CHARACTERISTICS

EXERCISES

1. Find the contrary of these characteristics. For example:
   HARD – SOFT
   1. FRAGILE
   2. LIGHT
   3. RIGID
   4. CLEAN
   5. ROUGH
   6. HOLLOW
   7. INERT
   8. STRAIGHT
   9. SHINY
  10. POINTED

2. Find an item on an aircraft made of each of these materials.
   1. COPPER
   2. STAINLESS STEEL
   3. HONEYCOMB
   4. FABRIC
   5. GLASS
   6. ALUMINIUM ALLOY
   7. PLASTIC
   8. RUBBER
   9. FOIL
  10. COMPOSITE
Identify these descriptions. They are all different parts of the aircraft. Check your answers in the Exercise Key. (For notes on dimensions, see Module 1.)


2. Made from laminated glass. Incorporates electrical resistance.


4. Flexible. Made of rubber or plastic. Cylindrical. 3-4 cm. in diameter.

5. Solid, cylindrical steel body with hexagonal head, between 10 and 20 cm long.
DIMENSIONS

WING CENTER BOX

MAIN FRAMES

WHEEL WELL

WINDOWS

LANDING GEAR DOOR

STRINGER

RIVET

CLEAT

FRAME

CENTER FUSELAGE
# MAIN AIRCRAFT DIMENSIONS

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>aircraft centerline</td>
<td>central reference axis (A)</td>
</tr>
<tr>
<td>overall fuselage length</td>
<td>total length of fuselage (37.5 m)</td>
</tr>
<tr>
<td>datum (reference) fuselage length</td>
<td>design length (sometimes without tail cone or nose cone)</td>
</tr>
<tr>
<td>fuselage width</td>
<td>distance from side to side (3.95 m)</td>
</tr>
<tr>
<td>wingspan</td>
<td>distance from one wing tip to the other (34.1 m)</td>
</tr>
<tr>
<td>ground clearance</td>
<td>distance from ground to lowest point on aircraft or engine (0.56 m)</td>
</tr>
<tr>
<td>wheel base</td>
<td>distance from nose gear to main gear (12.64 m)</td>
</tr>
<tr>
<td>height to tip of vertical stabilizer</td>
<td>ground to top of fin (11.76 m)</td>
</tr>
<tr>
<td>wheel track</td>
<td>distance between 2 main gears (7.59 m)</td>
</tr>
<tr>
<td>wing area</td>
<td>surface of wing</td>
</tr>
<tr>
<td>mean aerodynamic chord</td>
<td>line from leading to tailing edge (C)</td>
</tr>
</tbody>
</table>
### Describing Dimensions

<table>
<thead>
<tr>
<th>NOUN</th>
<th>ADJECTIVE</th>
<th>VERB</th>
</tr>
</thead>
<tbody>
<tr>
<td>measurement</td>
<td></td>
<td>measure</td>
</tr>
<tr>
<td>height</td>
<td>high</td>
<td></td>
</tr>
<tr>
<td>length</td>
<td>long</td>
<td></td>
</tr>
<tr>
<td>width</td>
<td>wide</td>
<td></td>
</tr>
<tr>
<td>thickness</td>
<td>thick</td>
<td></td>
</tr>
<tr>
<td>depth</td>
<td>deep</td>
<td></td>
</tr>
<tr>
<td>weight</td>
<td>heavy</td>
<td>weigh</td>
</tr>
<tr>
<td>capacity</td>
<td></td>
<td>hold</td>
</tr>
</tbody>
</table>

There are different ways to describe dimensions in English, using nouns, adjectives and verbs. The most common way is with an adjective or a verb, e.g.

The height of the vertical stabilizer is 11.76 m.
The vertical stabilizer is 11.76 m high.

The length of the fuselage is 37.57 m.
The fuselage is 37.57 m long.

The width of the fuselage is 3.95 m.
The fuselage is 3.95 m wide.
The thickness of the spacer is 2 mm.
The spacer is 2 mm thick.

The depth of the wing center tank is 80 cm.
The wing center tank is 80 cm deep.

The weight of the aircraft is 57,000 kg.
The aircraft weighs 57,000 kg.

The measurements of the cargo hold are 2.09 m x 4.95 m.
The cargo hold measures 2.09 m x 4.95 m.

The capacity of the inner tank is 6,900 litres.
The inner tank holds 6,900 litres.
All these adjectives of dimension are with an incorrect contrary, e.g. WIDE is not the contrary of LONG. It is SHORT. Cross out the incorrect word and write the correct contrary in the right-hand column. If you have difficulty, look at the Exercise Key.

<table>
<thead>
<tr>
<th>ADJECTIVE</th>
<th>INCORRECT CONTRARY</th>
<th>CORRECT CONTRARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>LONG</td>
<td>WIDE</td>
<td></td>
</tr>
<tr>
<td>THICK</td>
<td>DEEP</td>
<td></td>
</tr>
<tr>
<td>HIGH</td>
<td>LONG</td>
<td></td>
</tr>
<tr>
<td>WIDE</td>
<td>HEAVY</td>
<td></td>
</tr>
<tr>
<td>SHORT</td>
<td>SHALLOW</td>
<td></td>
</tr>
<tr>
<td>THIN</td>
<td>LIGHT</td>
<td></td>
</tr>
<tr>
<td>LOW</td>
<td>NARROW</td>
<td></td>
</tr>
<tr>
<td>HEAVY</td>
<td>SHORT</td>
<td></td>
</tr>
<tr>
<td>LIGHT</td>
<td>HIGH</td>
<td></td>
</tr>
<tr>
<td>DEEP</td>
<td>THICK</td>
<td></td>
</tr>
<tr>
<td>SHALLOW</td>
<td>THIN</td>
<td></td>
</tr>
<tr>
<td>NARROW</td>
<td>LOW</td>
<td></td>
</tr>
</tbody>
</table>

CROSSWIND

HEADWIND →

TAILWIND
What do these different values and units refer to? Look at the example:

3,650 m = a length

1. 3,000 p.s.i.
2. 129.75 MHz
3. 115 V 400 Hz
4. 31,000 feet
5. 800°
6. 195 Kt
7. 48 bar
8. 22°C
9. 98% N1
10. 1013 mb
11. 6,000 r.p.m.
12. Feb 20/92
13. 29 VU
14. 240 liters/min
15. STA 1590
16. p.31-12-00
17. 0.5 mm
18. ATA 36
19. MSN 194
20. 93 NM
21. CFM 56
22. 75 daN
23. 26 WE
24. Fig. 002
25. 0.06 in dia.
NOTES

Purpose = objective, target, function, aim, utilization. There are different ways to express purpose:

1. THE PURPOSE OF THE IS TO
   The purpose of the test bench IS TO test the equipment.
   The purpose of the Follow-up Mechanism IS TO shut the control valve.
   The purpose of the drain valves IS TO drain water.

2. THE IS USED/DESIGNED/MADE TO
   The test bench is used to test the equipment.
   The Follow-up Mechanism is designed to shut the control valve.
   The drain valves are made to drain water.

3. THE IS USED/DESIGNED/MADE FOR + “ING”
   The test bench is used for testing the equipment.
   The Follow-up Mechanism is designed for shutting the control valve.
   The drain valves are made for draining water.
N.B. Sentences of types 1 and 2 are the most common in English.
Remember:
* to + infinitive
* for + -ing
Not for to
Here are some other common ways to express PURPOSE or FUNCTION:

PROVIDES + noun
The oil system provides lubrication for the bearings.
A double step-down reduction-gear provides the drive for the propeller.
The APU provides electrical power for ground operation.

ACT AS, SERVE AS + noun, SERVE TO + infinitive
The spill valve in the fuel pump acts as a safety valve.
The APU serves as a supplemental power source when required in certain flight phases.
The air also serves to pressurize the labyrinth seals.

ENABLE, PERMIT, ALLOW + noun
(See Module P: ACTIVE AND PASSIVE for other applications)
Two transfer contactors enable complete AC supply by any of the three generators.
A swivel assembly permits the flow of hydraulic fluid.
A back-up unit allows constant monitoring.

SIMPLIFICATION
There is a tendency to simplify technical English in recent documentation (see Module X: SIMPLIFIED ENGLISH). In more recent documentation you will find sentences like these. Compare them with the sentences in sections 1 to 6 of these notes.
The test bench tests the equipment.
The follow-up mechanism shuts the control valve.
The drain valves drain water.
The oil system lubricates the bearings.
A double step-down reduction-gear drives the propeller.
The air pressurizes the labyrinth seals.
A back-up unit monitors constantly.
EXERCISES

Identify the systems which agree with the purposes below and write the corresponding letter in the space. Look at the example:

The ? is designed to house the engine compressor.  

A. GPU  I. SCAVENGE PUMP  
B. THROTTLE LEVERS J. DIM KNOB  
C. RUDDER PEDALS K. CONTROL WHEEL  
D. CHECK VALVE L. O-RING  
E. SPOILER M. BATTERIES  
F. TEMPERATURE SENSOR N. ANTENNA  
G. CONSTANT SPEED DRIVE O. FILTER  
H. SURGE VENT TANK P. COMPRESSOR CASING

1. The purpose of the ? is to control the ailerons.  
2. The ? is used to adjust the lights.  
3. The ? is designed for transmitting signals.  
4. The ? is made to seal unions and ensure tightness.  
5. The ? provides electrical power on the ground.  
6. The ? acts as a means of connecting the tanks to the atmosphere.  
7. The ? serve to supply electrical power in an emergency.  
8. The ? enable engine control.  
9. The ? is designed to trap (catch, collect) particles.  
10. The purpose of the ? is to coordinate turns and reduce lift on the wing.  
11. The ? is used to rotate the generator at the same speed.  
12. The ? serves to draw (suck, recover) oil or fuel.  
13. The ? provides a flow in one direction.  
15. The purpose of the ? is to control the aircraft on the yaw axis.
Complete these sentences with these words:
PURPOSE TO USED PROVIDES FOR ACTS ENABLES ARE

1. The accelerometer is made ........................................ monitoring engine vibrations.
2. The accelerometer is designed ........................................ monitor engine vibrations.
3. The accelerometer ........................................ to monitor engine vibrations.
4. The ........................................ of the accelerometer is to monitor engine vibrations.
5. The accelerometer ........................................ as an engine vibration monitoring device.
6. The accelerometer ........................................ engine vibration monitoring.
7. The accelerometer ........................................ engine vibrations to be monitored.
8. Engine vibrations ........................................ monitored by the accelerometer.

Put together (match) the systems and components below with the descriptions of their purpose or function.

| AIRBRAKES        | OVERHEAD BAGGAGE RACKS |
| ARMREST          | ELECTRICAL PUMP        |
| JACKS            | HORIZONTAL STABILIZER  |
| VSI              | ESCAPE SLIDE           |
| CROSSFEED VALVE  | THROTTLE LEVERS        |
| WARNING LIGHTS   | PASSENGER CALL BUTTON  |
| SEAT RAILS       | CARTRIDGE/SQUIB        |
| PITOT TUBE       | BUSBAR                 |
| CIRCUIT BREAKERS | SERVOCONTROLS          |
| PROXIMITY DETECTOR | BRAKE FANS            |

1. They are used to cool the brakes.

2. Its purpose is to distribute electrical power.

3. They enable the a/c to be raised off the ground for maintenance.
4. They increase drag but do not reduce lift.

5. The passenger presses it to attract the cabin crew’s attention.

6. It provides detection of door closure, shock absorber compression, etc.

7. They move the control surfaces.

8. It is used to evacuate the passengers in an emergency.

9. It supports your arm on a seat.

10. It is made to measure dynamic air pressure.

11. They are designed to protect electrical circuits.

12. They are used to increase and decrease engine thrust.

13. It provides pitch trim.


15. It enables a hydraulic system to be pressurized when the engines are shut down

16. It is made to discharge a fire extinguishing bottle.
17. They are designed to give a visual indication of a failure.

18. They act as a support for the cabin seats.

19. They are used to stow carry-on baggage.

20. Its purpose is to connect the fuel tanks in the two wings.
Conjunctions are connection words. They connect the ideas in a sentence. They define the logical relation between the ideas. They are very important. These are conjunctions:

*and*  *but*  *so*  *as*  *in order to*  *if*  *when*

Each conjunction has a different function in the sentence.

<table>
<thead>
<tr>
<th>CONJUNCTION</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>and</em></td>
<td>addition, complementary (+)</td>
</tr>
<tr>
<td><em>but</em></td>
<td>difference, comparison, incompatibility (/)</td>
</tr>
<tr>
<td><em>so</em></td>
<td>consequence, result (→)</td>
</tr>
<tr>
<td><em>as</em></td>
<td>reason, explanation (←)</td>
</tr>
<tr>
<td><em>in order to</em></td>
<td>objective, purpose (▽)</td>
</tr>
<tr>
<td><em>if</em></td>
<td>condition (*)</td>
</tr>
<tr>
<td><em>when</em></td>
<td>time (⊙)</td>
</tr>
</tbody>
</table>
Notice how the sentence changes with the conjunction:

<table>
<thead>
<tr>
<th>The part is removed</th>
<th>and</th>
<th>repaired in the workshop.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The part is removed</td>
<td>but</td>
<td>it is serviceable.</td>
</tr>
<tr>
<td>The part is removed</td>
<td>so</td>
<td>it must be replaced.</td>
</tr>
<tr>
<td>The part is removed</td>
<td>as</td>
<td>it is unserviceable.</td>
</tr>
<tr>
<td>The part is removed</td>
<td>in order to</td>
<td>repair it.</td>
</tr>
<tr>
<td>The part is removed</td>
<td>if</td>
<td>it is faulty.</td>
</tr>
<tr>
<td>The part is removed</td>
<td>when</td>
<td>it has 5,000 cycles.</td>
</tr>
</tbody>
</table>

These conjunctions have the same function, but their precise use or meaning may vary.

<table>
<thead>
<tr>
<th>AND (+)</th>
<th>BUT (⊥)</th>
<th>SO (→)</th>
<th>AS (←)</th>
</tr>
</thead>
<tbody>
<tr>
<td>moreover</td>
<td>however</td>
<td>therefore</td>
<td>because</td>
</tr>
<tr>
<td>furthermore</td>
<td>whereas</td>
<td>consequently</td>
<td>because of</td>
</tr>
<tr>
<td>in addition</td>
<td>whilst</td>
<td>thus</td>
<td>due to</td>
</tr>
<tr>
<td>and also</td>
<td>although</td>
<td>as a result</td>
<td></td>
</tr>
<tr>
<td>as well as</td>
<td>despite</td>
<td>hence</td>
<td>since</td>
</tr>
<tr>
<td></td>
<td>in spite of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>nevertheless</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>even though</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IN ORDER TO (∨)</th>
<th>IF (+)</th>
<th>WHEN (⊗)</th>
</tr>
</thead>
<tbody>
<tr>
<td>so as to</td>
<td>provided (that)</td>
<td>as soon as</td>
</tr>
<tr>
<td>to</td>
<td>unless</td>
<td>until</td>
</tr>
<tr>
<td>so that</td>
<td>should</td>
<td>before</td>
</tr>
<tr>
<td></td>
<td>after</td>
<td>as long as</td>
</tr>
<tr>
<td></td>
<td>while</td>
<td></td>
</tr>
</tbody>
</table>

Here are some examples to identify the basic functions.

**ADDITION, COMPLEMENTARITY (+)**
The display gives horizontal and vertical position.
The THS is electrically commanded. Moreover, it has a mechanical back-up system.
In case of fire, the red warning light illuminates. In addition, the audio warning sounds.
COMPARISON, DISTINCTION, INCOMPATIBILITY (I)

The relay is actuated by a microswitch, but the control is manual.
The relay is actuated by a microswitch, however, the control is manual.
Although the relay is actuated by a microswitch, the control is manual.
Despite the actuation of the relay by a microswitch, the control is manual.
Indication is automatic, whereas control is manual.

CONSEQUENCE (→)

The discharge valve is opened, so the air is released.
The discharge valve is opened. As a result, the air is released.
There is a short circuit, therefore the circuit breaker trips.
The APU operates on the ground. Thus the cabin is ventilated.

REASON (←)

The oxygen masks drop because the cabin altitude increases.
The oxygen masks drop because of an increase in cabin altitude.
The flight is delayed due to bad weather.
The flight is delayed as the weather is bad.

OBJECTIVE (∨)

Press the POWER TEST push-button in order to test the window heating
Open the door (so as) to have access to the panel.
Energize the a/c so that the engineer can perform the pre-flight tests.
**CONDITION (**)  
*If* a drain valve leaks, the piston is changed.  
The caption light illuminates, *if* the temperature rises.  
The aircraft can depart *provided that* there are no No-go items.  
*If* the APU is inoperative, the engines cannot be started *unless* there is an air start unit.

**TIME (Θ)**  
*When* the aircraft touches down the spoilers extend.  
The green arrows illuminate *as soon as* the gear is downlocked.  
The red lights remain illuminated *until* the gear is downlocked.  
The red lights remain illuminated *as long as* the gear is not downlocked.
CONJUNCTIONS

EXERCISES

Find the “odd man out”, i.e. the conjunction which does not have the same general function or sense as the others. Look at the example:

AND, BUT, ALSO. (BUT is the odd man out because it has a different function.)

but

1. SO, THEREFORE, BECAUSE.
2. DUE TO, CONSEQUENTLY, SO.
3. MOREOVER, UNTIL, AS SOON AS.
4. FURTHERMORE, ALTHOUGH, AND.
5. SINCE, WHEREAS, BUT.
6. BECAUSE OF, SO AS TO, DUE TO.
7. NEVERTHELESS, UNLESS, HOWEVER.
8. AS WELL AS, AND, EVEN THOUGH.
9. AS, PROVIDED THAT, DUE TO.
10. HOWEVER, UNTIL, ALTHOUGH.

Choose the conjunction that is most appropriate. Delete the others, as in the examples:

The INS is inoperative AND/SO/HOWEVER the aircraft is grounded.
The inner tanks are located between ribs 1 and 14 THEREFORE/UNLESS/ WHEREAS the outer tanks are between ribs 14 and 27.
The gear doors can be closed on the ground PROVIDED THAT/ FURTHERMORE/SO THAT there is hydraulic power.

1. The standby frequency is effective IF/SO THAT/AND the transfer key is pressed.
2. ADF sense antenna 1 is on the left lower fuselage THUS/SINCE/WHEREAS N° 2 is on the right.
3. The HUD enables landing BECAUSE/PROVIDED/ALTHOUGH visibility is poor.

4. The needle is in the green range AS A RESULT/UNLESS/THUS the nitrogen pressure is low.

5. The glide scale is displayed on the ADI IN ORDER TO/SO/MOREOVER it is repeated on the HSI.

6. The shut-off valve is electrically controlled IF/BUT/BECauses pneumatically operated.

7. Each seat back is hydraulically reclinable. FURTHERMORE/SO/AS you can manually fold the back forward.

8. The absence of the washer does not affect installation. IN ADDITION/HOWEVER/SO it should be mounted at the next removal.

9. Cables are worn DUE TO/DESPITE/BECauses an absence of protection.

10. The timer generates a reset signal IN ORDER TO/THEREFORE/IF the flag remains inactive for more than 350 ms.

11. The landing gear “ground/flight” microswitches close SO THAT/DESPITE/AS SOON AS the shock absorber is compressed.

12. Seat belts are fastened PROVIDED THAT/UNTIL/UNLESS the aircraft reaches its gate.

13. The probes are covered BECAUSE OF/IN ORDER TO/BECauses prevent contamination.

14. The rain repellent system is not used UNLESS/AS SOON AS/DESPITE the rain is very heavy.

15. The system was inoperative. THEREFORE/HOWEVER/SO the aircraft took off.

Use these basic conjunctions in the sentences 1-10: “and”, “but”, “so”, “so as to”, “if”, “due to”, “although”, “whereas”. Look at the examples:

The aircraft network uses AC AND DC power.
The F27 is a turboprop BUT the A 300 is a turbofan.
The anti-shimmy is used SO AS TO to reduce nosewheel vibration.

1. The standby system is used .................................. the main system fails.

2. There is a pressure drop ........................................ pump failure.

3. Both the low ........................................ high levels are pre-adjusted.
4. Main wheel brakes can be applied at touchdown the nose gear shock absorber is not compressed.

5. The blower fan is inoperative the equipment may overheat.

6. The amplifier is designed to give the flight crew priority over the hostess.

7. Check the line for faults the antenna does not tune.

8. The card is faulty. it must be replaced.

9. VHF transceiver 1 is mounted on rack 3 VHF transceiver 2 is moun- ted on rack 5.

10. Voltage reading is not an absolute indication of battery condition. it is recommended to have the batteries reconditioned if values are low.

Decide if these sentences are logical with their conjunctions. “YES” = logical, “NO” = illogical. If they are illogical, suggest another conjunction. Look at the examples:

There was an engine fire SO the extinguisher was discharged. Yes

There was an engine fire BECAUSE the extinguisher was discharged. No So

1. The leading edge is de-iced IN ORDER TO prevent ice formation.

2. The tire is not damaged AS a hard landing.

3. The seal is old HOWEVER it must be replaced.

4. The outflow valve is operated DUE TO regulate cabin pressure.

5. The part is serviceable THEREFORE it must be removed.
(See Module D: INSTRUCTIONS, PROCEDURES.)

In this module there are 50 (fifty) basic human actions which are defined with examples and some illustrations.

(See also Modules O: MOVEMENT, Q: PROCESSES, S: STATES and Y: MAINTENANCE VERBS for more technical [mechanical/electrical] actions.)

**RAMP MECHANIC’S CHECKLIST**

**APPLY** (put into application [instruction], put on [paint, varnish etc.], put into action [brakes, pressure etc.])

Apply the AMM procedure.

Sealant is applied every 500 hours.

The pilot applies the brakes.

**BEND** (curve, put under tension, set at an angle)

The hose is bent for installation on the landing gear.

**BLANK** (close an opening temporarily with a cap, cover, plug etc.)

After PTU removal, blank the disconnected pipes.

**CANCEL** (suppress, stop, annul, destroy, clear)

The audio cancel push-button stops the aural warning (chime, bell, horn etc.).

**CARRY OUT** (do, execute, perform an action)

The mechanic carries out the operational test of the HF system.

**CHECK** (verify, make sure, test)

Check the phase sequence before cutting in the GPU.
CLEAR (remove an obstacle, information, display, etc.)
The screen is cleared, when another function key is pressed.

CLOSE (shut, ≠ OPEN)
The valve has 2 positions: open and closed.

COMPLY (WITH) (conform to, respect, obey regulations, instructions, plans etc.)
The airlines comply with Airworthiness Directives.

CONNECT (join, attach, link, fasten)
The ADC is connected to the flight instruments.

For the last 40 (forty) actions, the verb is blank in the example. Fill in the blank with the correct form of the verb, i.e. the imperative, the infinitive (“to” + the basic verb form) or the verb with an “-s”, “-es”, “-ed” or “-ing” ending. The answers are all in the Exercise Key.

DEACTIVATE (make inactive, stop, cut, isolate)
The wing anti-ice system is ........................................... when the a/c is on the ground.

DE-ENERGIZE (cut electrical power)
An overheat thermostat ........................................... the resistance when a window overheat condition exists.

DEPRESS (press, push, ≠ DEPRESSURIZE!)
N.B. “Depress” is the subject of the example sentence.
........................................... the LOOPS push-button tests the continuity of the fire detection loops.
EASE (move slowly, regularly, carefully without sudden movements)
The engine mount bolts are .................................. into position.

FASTEN (attach, secure)
The seat belts are ............................................. at take-off.

FILL (make full, put into a container to a known quantity)
The water tank is ............................................... during turnaround.

FULFILL(L) (satisfy, comply with, respect)
Maintenance practices must ................................ the Authorities’ requirements.

HANDLE (manipulate, touch, move)
Caution! ......................................................... with care.

HOIST (raise using chain and pulley, a crane, ropes, etc.; pull up from above, lift)
The engine is .................................................... into place under the pylon.

INCREASE (make larger, make higher, increment, augment)
The pilot ......................................................... Nl to 97%.

JACK (UP) (raise, lift the aircraft off the ground using “jacks” for maintenance operations)
................................................................. points are located under the nose and wings.
LEAVE (1. quit, part; 2. remain [to be left], not to remove)
1. The flight ................. the gate at 16.45.
2. Do not .................. foreign objects on the ground near the aircraft.

LET (permit, allow)
........................................ the tires cool before checking the pressure.

MARK (identify, label, designate)
All components are .................. with a serial number.

MATCH (fit together, put together two similar things, make points correspond)
Only use .................. Part Numbers when replacing a component.

MOUNT (install, put into position)
Place new gasket over .................. studs on gear box.

OBEY (follow orders, respect instructions, etc.)
For test procedure, .................. instructions in AEB 88905.

OPEN (uncover, ≠ close, shut)
During door .................., stand clear of door travel area.

OVERRIDE (neutralize an action, take priority over)
If the oxygen masks do not fall at 14,000 ft, the Flight Engineer .................. the automatic system.
PLAN (make plans, project, schedule)
The overhaul is ________________ in November.

POSTPONE (delay, put back a date, make later)
As there is a workload problem, we must ________________ the C-check for a week.

PRESET (select in advance)
The cabin altitude is ________________ for cruise.

PRESS (push, depress)
______________the light to test the bulb.

PUSH (press with force in order to move)
The tug (tractor) ________________ back the aircraft from the stand.

RAISE (move up, lift)
The switch must be ________________ to the MAINT INPH position to communicate with ground service personnel.

READ (1. receive information from instruments, etc.; 2. [for an instrument ] show, indicate)
1. The crew must ________________ the height on the Radio Altimeter.
2. The NI limit computer ________________ 106.8%
REMOVE (take away, drop from the aircraft, ≠ install)
Before the aircraft leaves the line mechanic .................. the ground safety pin.

REPLACE (remove a component and install another one)
Test the transducer on the bench. If it is unserviceable, .................. it.

REQUEST (ask for)
On arrival, the flight crew may .................. technical assistance from the station.

REQUIRE (need, demand, be necessary)
If the management unit is faulty, a new one is ..................

RESET (reposition, return to initial position, position at zero)
The Rudder Trim is .................. to zero.

RIG (adjust, regulate - flight control linkage, engine controls, etc.)
Engine .................. is performed after engine installation.

ROTATE (turn)
The range is selected by .................. the rotary selector.

SEND (transmit, direct, cause to go)
The gyro data is .................. to the Heading Control Unit.

SET (position, select, place, choose a value, push a C/B)
The FD Command rotary selector is .................. at NORM.
SHIFT (move sideways, translate, change the position of something)
The cargo containers can be ........................................ from one bay to another.

TIGHTEN (turn a bolt, screw, etc. clockwise, ≠ loosen)
The bolts are ........................................ with a torque wrench.

TRIP (pull, open, disconnect a circuit breaker)
Before working on a circuit ........................................
the respective C/B.

USE (utilize, employ)
A torque wrench is ........................................ to tighten
bolts precisely.

WITHDRAW (remove, pull out, extract, take out of service)
After the SB, the old Part Number will be .........................................
Use the 50 verbs in the notes of this Module to complete these sentences. Fill in each blank with the correct verb, as in the example:

Conditioned air may be **used** for internal surface defogging.

1. **used** fuel tanker hose couplings to the two aircraft refuel/defuel couplings.

2. **used** the RESET button will turn off the blue call lights.

3. When the switch is in the OFF position all exterior service interphone Jacks are **used**

4. **used** switch to TEST; **used** that stick-shaker vibrates.

5. **used** the oil sump until the FULL indication appears in the sight glass.

6. Untighten and **used** the mounting plate.

7. **used** the antenna carefully, sufficient to gain access to the connector.

8. **used** MS4 compound around the VHF and marker beacon antenna connectors.

9. **used** all applicable ADF circuit breakers.

10. **used** a check with a control station to test transmission and reception.

11. The course pointer is **used** in either direction.

12. Connect the indicator to the test transmitter **used** test cable 1489453. (= by means of: USE)

13. One unit is **used** on the top of each flux valve.

14. **used** the unit with great care during removal; a shock may result in damage.

15. No further lubrication is **used** until the instrument is overhauled.
16. ........................................ the aircraft electrical power network before performing the work.

17. Slowly ........................................ the engine speed from idle to maximum permissible r.p.m.

18. After 3 unsuccessful attempts, ........................................ the starter motor 5 minutes before trying again.

19. Ensure that you ........................................ connectors and receptacles.

20. To change a wheel the corresponding gear is ........................................ up.

Choose the word in the list below which has the same meaning as the words or expressions in 1-25.

<table>
<thead>
<tr>
<th>PRESET</th>
<th>RIG</th>
<th>USE</th>
<th>DE-ACTIVATE</th>
<th>MOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLOSE</td>
<td>MATCH</td>
<td>COMPLY</td>
<td>MARK</td>
<td>FASTEN</td>
</tr>
<tr>
<td>INCREASE</td>
<td>REMOVE</td>
<td>SHIFT</td>
<td>APPLY</td>
<td>CANCEL</td>
</tr>
<tr>
<td>SHIFT</td>
<td>REQUEST</td>
<td>JACK</td>
<td>EASE</td>
<td>READ</td>
</tr>
<tr>
<td>OVERRIDE</td>
<td>LET</td>
<td>CARRY OUT</td>
<td>RESET</td>
<td>CONNECT</td>
</tr>
</tbody>
</table>

1. join, attach, link
2. ask for, demand
3. conform to
4. utilize
5. move slowly and regularly
6. annul, suppress
7. take away, ≠ install
8. associate
9. select a value in advance
10. put into action
11. perform, do
12. install
13. isolate, make inactive
14. a belt, attach
15. move laterally or longitudinally
16. raise aircraft for wheel change or maintenance
17. shut
18. permit, allow
19. display, indicate
20. make bigger, increment
21. verify
22. reposition
23. adjust, regulate flight control or engine cables
24. identify
25. give priority order
POSSIBILITY

Use *can* + infinitive to express possibility. (It is usually better than “it is possible to/that...”.)

*Can* expresses physical or technical possibility, capacity etc. For example:

The A320 *can* carry 172 passengers.

Coaxial cables *can* transmit numerous messages.

In the event of an engine failure, the remaining engine *can* power all the hydraulic systems through the PTU.

The APU *can* be started up to 25,000 feet.
PROBABILITY

*May* is used to indicate that an action or event could occur (happen). *Could* is also used.
In a technical context, this applies more to natural phenomena, unplanned technical incidents, failures, etc. For example:
In dense cloud, ice *may* form on the wings.
If there is a lot of traffic on arrival, the aircraft *may* have to hold before landing.
If the washer is perished (worn, old), the union *may* leak.
The assembly *may* be repaired before overhaul.
Hot oil *could* cause injury.

**N.B. In everyday English, can and may are often interchangeable. In Simplified English, use only can.**

NECESSITY

*Must, shall and have to* are commonly used to express necessity (Do not use: *"It is necessary to/that"*.) e.g.
If the tire is deflated the mechanic *must* remove it.
When open on the ground, the landing gear bay doors *shall* be safetied (locked by a safety pin or sleeve).
During refueling, fire fighting equipment *has to* be available (ready for use).
Non-approved lubricants *shall not* be used.

**N.B. In technical and legal English, shall does not indicate the future, but an idea of necessity. Shall = must.**

The adjectives *mandatory* and *compulsory* are often employed in official documents, e.g.
Airworthiness Authority (i.e. FAA, DGAC, CAA, etc.) approval is *mandatory.*
It is *compulsory* to inform the Captain of any dangerous cargo.

**Direct prohibitions take the following form:**
It is *forbidden* to smoke during refueling.
Smoking during refueling is *prohibited.*

*Should* expresses a recommendation rather than a necessity:
Chocks *should* be placed under the main gear wheels during a night stop.

*Need* expresses a requirement, obligation, necessity:
The filter *needs* to be replaced every 500 hours.
The mechanics *need* a special tool for the job.
4 CONDITIONS

Conditions are usually associated with if and should. Other conditional words or expressions are in Module K: CONJUNCTIONS (provided that, unless).

In the event of and in case of also introduce conditional situations. In most technical documents, only the basic form of the conditional is employed, i.e. present simple + present simple or present simple + future, e.g.

If the normal servovalve fails, the alternate servovalve takes over.
Should the normal servovalve fail, the alternate servovalve will take over.
In the event of normal servovalve failure, the alternate servovalve takes/will take over.
In case of normal servovalve failure the alternate servovalve will take over.

With minor variants of construction, these expressions are interchangeable.

5 SOME MORE EXAMPLES

If one logic is not in accordance with the other, the TO CONFIG WARN failure message is triggered. (Condition)
The outer tank can hold 3,500 kg. (Capacity)
Water may accumulate in the lower fuselage. (Probability)
When the demand for cooling air decreases, the Ram Air Outlet must be closed. (Necessity)
The scavenge filter should be hand tightened. (Recommendation)
Choose CAN, MAY, MUST, SHOULD or NEED to complete these sentences, as in the example:

The tanks MUST be drained before the first flight.

1. The handpump .......... pressurize the yellow system.
2. The tires ............. be damaged by a hard landing.
3. Only original parts .......... be used, but approved equivalent parts .......... be installed.
4. A safety pin .......... be inserted on the ground.
5. Ice ........ form on the wings.
7. The checklist .......... be performed before engine start.
8. Channel 1 .......... replace Channel 2.
10. The crack .......... be stopped immediately.
11. The FAA regulations .......... be respected.
12. The green hydraulic system .......... pressurize all the users.
13. The network .......... a 27 VDC supply.
14. Skydrol .......... burn or cause corrosion.
15. The circuit breaker .......... be safetied before beginning work.
16. The engines .......... provide 52 tonnes of thrust.
17. We .......... 8,000 liters of fuel.
18. The tank .......... contain 25,000 liters.

20. If necessary, the aircraft fly on one engine.

21. The safety pin be removed before flight.

22. When the APU is inoperative, the crew the GPU.

23. The unit be replaced, but it is not mandatory.

24. A failure on a no-go item be repaired.

25. You use a mask when you cut composite materials.
ACROSS

1. mixture of metals (5)
2. distance from wing tip to wing tip (8)
3. to adjust cables etc. (3)
4. negative (2)
5. vertical movement (2)
6. to curve (4)
7. conjunction of contrast (3)
8. indicate, show (7)
9. for example (2)
10. transparent substance (5)
11. from one side to the other (7)

DOWN

1. circular movement (6)
2. above or ...................... (4)
3. ≠14 across
4. translate, move longitudinally (5)
5. since (2)
6. manipulate, touch (6)
7. expresses means (2)
8. ask for (7)
9. indicates action or function (3)
10. after (4)
11. for time or position (2)
ACROSS
12. check operation (4)
13. ≠ hard (4)
14. ≠ in (2)
15. ≠ straight (6)
16. necessity (4)
17. move gradually (4)
18. in spite of (8)
19. action performed (2)

DOWN
12. anti- or ................. clockwise (7)
13. ≠ soft (4)
14. ≠ install (6)
15. possibility, to be able (3)
16. distance from side to side (5)
17. to position (3)
18. to secure, to screw (7)
19. ≠ pull

2 Put together (match) the words with the same meaning in the two columns below. The first example has been done for you.

1. aft .................................................. V. rear .................................................. A. return of information
2. match .................................................. .................................................. B. used to
3. override .................................................. .................................................. C. to position
4. because of .................................................. .................................................. D. dangerous
5. pointed .................................................. .................................................. E. forward part of wing
6. perform .................................................. .................................................. F. inboard
7. bleed air .................................................. .................................................. G. function of a loader
8. clean .................................................. .................................................. H. compulsory
9. must .................................................. .................................................. I. therefore
10. feedback .................................................. .................................................. J. maintains itself
11. under .................................................. .................................................. K. air from engine compressor
12. armed .................................................. .................................................. L. alternative system
13. set .................................................. .................................................. M. from side to side
14. back-up .................................................. .................................................. N. whilst
15. mandatory .................................................. .................................................. O. sharp
Some of the letters are missing in the words below. Try and complete as many as you can. All the words are in Modules A-M. Look at the example:

```
B_C_U_E  because
L_A_L_G   E_G_ leading edge
```

1. MAN_ATO_Y  4. T_ST
2. COUNT_RCL_CKW_S_  5. A_
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>SHO-LD</td>
</tr>
<tr>
<td>8.</td>
<td>WHER-AS</td>
</tr>
<tr>
<td>9.</td>
<td>D-PTH</td>
</tr>
<tr>
<td>10.</td>
<td>IN O-D-R TO</td>
</tr>
<tr>
<td>11.</td>
<td>T-R-UGH</td>
</tr>
<tr>
<td>12.</td>
<td>R-M-VE</td>
</tr>
<tr>
<td>13.</td>
<td>RES-T</td>
</tr>
<tr>
<td>14.</td>
<td>H-N-YCOMB</td>
</tr>
<tr>
<td>15.</td>
<td>R-BBER</td>
</tr>
<tr>
<td>16.</td>
<td>STRAL-HT</td>
</tr>
<tr>
<td>17.</td>
<td>R-UGH</td>
</tr>
<tr>
<td>18.</td>
<td>HOW-V-R</td>
</tr>
<tr>
<td>19.</td>
<td>CLE-R</td>
</tr>
<tr>
<td>20.</td>
<td>A-OUND</td>
</tr>
<tr>
<td>21.</td>
<td>N-R-OW</td>
</tr>
<tr>
<td>22.</td>
<td>B-CAUS-</td>
</tr>
<tr>
<td>23.</td>
<td>MON-T-R</td>
</tr>
<tr>
<td>24.</td>
<td>P-SH</td>
</tr>
<tr>
<td>25.</td>
<td>T-IP</td>
</tr>
<tr>
<td>26.</td>
<td>F-RWA-D</td>
</tr>
<tr>
<td>27.</td>
<td>M-ST</td>
</tr>
<tr>
<td>28.</td>
<td>REQ-E-T</td>
</tr>
<tr>
<td>29.</td>
<td>C-OSS-EED</td>
</tr>
<tr>
<td>30.</td>
<td>ALT-OUGH</td>
</tr>
</tbody>
</table>
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PART 3

N. COMPARISONS
O. MOVEMENT
P. ACTIVE AND PASSIVE
Q. PROCESSES
R. FUNCTIONS
S. STATES, FAILURES, DAMAGE
INTRODUCTION

In Parts One and Two you saw most of the basic aspects of English. In Modules A to M there was more language than technology. In Part Three we will see the last two points of general English:

COMPARISONS (Module N)

ACTIVE AND PASSIVE (Module P)

We will then start looking at how English is used to describe different technical situations:

MOVEMENT (Module O)
Actions (“go up”, “flow”, “eject”, “deflect”, etc.) and other words (“about”, “alternating”, “clockwise”).

PROCESSES (Module Q)
Sequences, cause, effect, etc. using several conjunctions we already saw in Module K.

FUNCTIONS (Module R)
Expressing quantity, time, indication, composition, calculating, prevention, etc.

STATES, FAILURES, DAMAGE (Module S)
Examples of the most common normal and abnormal conditions grouped by the main aircraft systems.

So in Part Three we are building more specialized terms and language onto the basic foundations we became familiar with in Parts One and Two.

Do not forget to notice how all the things we saw in Modules A to M are used again in the examples in Part Three and in the Review on page 157. From time to time take a point you have already seen (word order, prepositions, conjunctions, endings, etc.) and find examples in your own technical documentation or in English for Aircraft Volume 2 (System Maintenance).

Take your time. Do only a little at once. At work, when you read your documentation, try and find examples of what you have seen in this book.
COMPARISONS

TURBOFAN
AIR INTAKE
COWL

PYLON
FIRE EXTINGUISHER
BOTTLE

CORE ENGINE
THRUST REVERSER
EXHAUST NOZZLE
POWER PLANT

NOTES

You can compare things in different ways:

COMPARATIVES

Most short adjectives take "-er", e.g.

<table>
<thead>
<tr>
<th>ADJECTIVE</th>
<th>COMPARATIVE</th>
<th>ADJECTIVE</th>
<th>COMPARATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>fast</td>
<td>faster</td>
<td>few</td>
<td>fewer</td>
</tr>
<tr>
<td>wide</td>
<td>wider</td>
<td>narrow</td>
<td>narrower</td>
</tr>
<tr>
<td>long</td>
<td>longer</td>
<td>deep</td>
<td>deeper</td>
</tr>
<tr>
<td>heavy</td>
<td>heavier (y → i)</td>
<td>hot</td>
<td>hotter (t → tt)</td>
</tr>
</tbody>
</table>
Long adjectives, past and present participles and most adverbs are preceded by more (+) or less (-), e.g.

<table>
<thead>
<tr>
<th>BASIC FORM</th>
<th>COMPARATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>difficult</td>
<td>more/less difficult</td>
</tr>
<tr>
<td>accurate</td>
<td>more/less accurate</td>
</tr>
<tr>
<td>reliable</td>
<td>more/less reliable</td>
</tr>
<tr>
<td>cracked</td>
<td>more/less cracked</td>
</tr>
<tr>
<td>damaged</td>
<td>more/less damaged</td>
</tr>
<tr>
<td>cooling</td>
<td>more/less cooling</td>
</tr>
<tr>
<td>time-consuming</td>
<td>more/less time-consuming</td>
</tr>
<tr>
<td>regularly</td>
<td>more/less regularly</td>
</tr>
<tr>
<td>slowly</td>
<td>more/less slowly</td>
</tr>
</tbody>
</table>

There are some irregular or unusual cases:

<table>
<thead>
<tr>
<th>ADJ/ADV</th>
<th>COMPARATIVE</th>
<th>ADJ/ADV</th>
<th>COMPARATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>better</td>
<td>bad</td>
<td>worse</td>
</tr>
<tr>
<td>many, much</td>
<td>more</td>
<td>little</td>
<td>less</td>
</tr>
</tbody>
</table>

All these comparatives are followed by “than” in a sentence, e.g.
The A321 is longer than the A320.
The new equipment is more reliable than the previous one.
The left wing is less damaged than the right one.
Carbon brakes wear more slowly than steel brakes.
Prevention is better than repair.
Use water rather than spirit. (in place of, instead of)

2 SUPERLATIVES

The and -est characterize the superlative. The same principles apply as for the comparative, e.g.

<table>
<thead>
<tr>
<th>ADJECTIVE/ADVERB</th>
<th>COMPARATIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>fast</td>
<td>the fastest</td>
</tr>
<tr>
<td>accurate</td>
<td>the most/least accurate</td>
</tr>
<tr>
<td>ADJECTIVE/ADVERB</td>
<td>COMPARATIVE</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>damaged</td>
<td>the most/least damaged</td>
</tr>
<tr>
<td>slowly</td>
<td>the most/least slowly</td>
</tr>
<tr>
<td>good</td>
<td>the best</td>
</tr>
<tr>
<td>bad</td>
<td>the worst</td>
</tr>
<tr>
<td>many, much</td>
<td>the most</td>
</tr>
<tr>
<td>little</td>
<td>the least</td>
</tr>
<tr>
<td>few</td>
<td>the fewest</td>
</tr>
</tbody>
</table>

Superlatives are usually followed immediately by a noun, e.g.
Concorde is the fastest civil transport.
The most damaged part of the fuselage is the forward section.
The best solution is the solution with the shortest downtime.
The radome is the most exposed part of the aircraft.

3 CONJUNCTIONS

(See Module K.)
A difference between two things can be expressed by words like:
but whereas whilst however

For example:
The ailerons are electrically controlled, but the rudder is mechanically controlled.
The left navigation light is red, whereas the right one is green.
Holds 1 and 4 take containers, whilst Hold 5 is a bulk compartment.
The primary flight controls are powered by three hydraulic systems. However the secondary flight controls are powered by two.

4 “AS”

Than expresses a difference. As expresses equality, identity or similarity, e.g.
This equipment has as many functionalities as the other one.
The response time is as short as possible.
Channel 2 is used as much as Channel 1.
The wheel can be lifted as far as 105 mm. (up to)
“Tailplane” means the same as “Horizontal Stabilizer”. 
DOUBLE COMPARATIVE

Two comparatives are used to express two parallel progressions, states, etc. For example:

*The higher* the altitude, *the colder* the atmosphere.
*The greater* the flap extension, *the slower* the landing speed.
*The longer* the flight, *the heavier* the trip fuel.
*The higher* the airspeed, *the lower* the rudder deflection angle.
1. Complete these sentences by putting the adjective, adverb, etc. in the right form, as in the examples:

The B747 is **heavier than** (HEAVY) the DC10.
The B747 is **the largest** (LARGE) civil transport.

1. 80° C is ___________________ (HOT) 80° F.
2. The ___________________ (BIG) negative differential pressure is -85 mb.
3. There is ___________________ (MUCH) fuel in the inner tank in the outer tank.
4. The First Class seats are ___________________ (COMFORTABLE) the Economy Class seats.
5. The landing speed is ___________________ (LOW) when the flaps are fully extended.
6. There are ___________________ (FEW) seats abreast in First Class in Economy.
7. The MAX position provides ___________________ (EFFICIENT) braking.
8. The A330 has a ___________________ (LONG) range the A320.
9. A check valve is the ___________________ (SAME) a non-return valve.
10. "Windshield" is American (conjunction) “windscreen” is British.
11. The ZFW is ___________________ (LIGHT) the MTOW.
12. A turbofan is ___________________ (EFFICIENT) a conventional jet engine.
13. The “endurance” is the ___________________ (LONG) time an aircraft can fly without refueling.
14. The aircraft’s “ceiling” is the ___________________ (HIGH) altitude it can fly at.
15. Built-in test equipment is the ___________________ (GOOD) way of trouble shooting quickly.
16. After 50 hours, the strut was (CRACKED) at the first inspection.

17. The reinforced areas offer (GOOD) resistance to the non-reinforced areas.

18. Automatic braking enables the plane to decelerate (SMOOTHLY).

19. Fail-safe systems have (LITTLE) probability of failure compared to other systems.

20. Microwave Landing Systems are (ACCURATE) compared to conventional ILS.

21. ILS is installed at all major airports (conjunction) MLS is rare.

22. The (SHORT) the runway, the (HARD) braking.

23. A jetty is (FAST) way of disembarking passengers.

24. There is (MUCH) risk of ice-formation when there are clouds in a clear sky.

25. The (HIGH) the engine speed, the (HOT) the EGT.

26. Engine 1 is (POWERFUL) Engine 2. (equality)

27. The square form factor also has (GOOD) mechanical properties compared to triangular shapes.

28. The (LONG) the pathlength the (GOOD) the performance characteristics.

29. The design approach is to build the instrument (LARGE) possible.

30. The elevators are deflected symmetrically. The LH elevator is deflected (MUCH) the RH elevator.
MOVEMENT

EXTEND

DRIVE

OPEN

TURN

ROTATE

DEPLOY

COMPRESS

TRANSMIT

SWIVEL

AIRSTAIRS
PHRASAL VERBS

The direction or type of movement is often expressed by simple verbs (go, run, move, come, etc.) + a preposition or adverb (see Module B). These are “Phrasal Verbs”, e.g.

<table>
<thead>
<tr>
<th>VERB</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>go up</td>
<td>ascend, climb, increase</td>
</tr>
<tr>
<td>go down</td>
<td>descend, fall, decrease</td>
</tr>
<tr>
<td>go along</td>
<td>extend, move longitudinally</td>
</tr>
<tr>
<td>go through</td>
<td>penetrate, go in and out, inspect</td>
</tr>
<tr>
<td>go over</td>
<td>cross, exceed, move on top of, investigate, etc.</td>
</tr>
</tbody>
</table>

The context determines the exact meaning of the verb, e.g.
The wiring goes up the wall. (= is routed up)
The aircraft goes up to FL 310 for cruise. (= climbs to)
As the thrust increases, the fuel consumption goes up. (= increases)

The preposition is a rough (approximate) guide to the meaning of the verb. However, prepositions are used with all verbs of movement to specify the nature of the movement.

VERBS OF MOVEMENT

Here are 50 verbs used to describe different types of movement. (See also Module L.) For each verb, v = the verb, n = the corresponding nouns or substantives, p = the associated preposition(s) or adverbs, etc.

v. ADVANCE (move forward, especially throttle levers)
   n. ADVANCE (especially throttle levers)
The throttles are advanced for power-up.

v. BRAKE (make a/c or engine decelerate)
   n. BRAKES, BRAKING
The thrust reverser helps to brake the aircraft.

v. BRING (carry, transport, move)
p. TO, BACK, ALONG, DOWN, UP, etc.
The catering truck brings the beverages to the aircraft.
v. **BYPASS** (avoid, go around)

n. **BYPASS VALVE**

In the event of overpressure, the filter is *bypassed*.

v. **CEASE** (stop, discontinue)

When Q22 *ceases* to conduct, the base circuit of Q2201 becomes open.

v. **COIL** (turn a wire around a core, etc.)

n. **COIL**

p. **AROUND**

The emergency descent rope is *coiled* around an inertial drum, or reel.

v. **COLLAPSE** (break down, fall apart)

n. **COLLAPSE**

If the safety sleeves are not mounted, the gear may *collapse* without hydraulic pressure.

v. **CONVEY** (transmit, transport, carry)

n. **CONVEYOR, CONVEYANCE**

p. **TO, FROM**

The monitoring channel *conveys* any fault messages to the Master Warning.

v. **CRANK** (rotate, motor an engine)

n. **CRANKING**

After a wet start the engine is *dry-cranked* before a second attempt.

v. **DECREASE** (diminish, drop, fall)

n. **DECREASE**

As the aircraft descends the cabin altitude *decreases*.

v. **DEFLECT** (move from neutral, deviate)

n. **DEFLECTION**

p. **ABOUT, FROM, TO, AROUND**

The surface *deflects* 20° about the axis.
v. Dismantle (disassemble, take apart, break down)
n. Dismantling
After removal, the assembly is *dismantled* for overhaul.

v. Drift (deviate, move sideways)
n. Drift
p. From, Away, Off
Strong crosswinds cause the aircraft to *drift* off course.

v. Drop (fall, decrease, go down, remove)
n. Drop
If the output voltage of the DC regulator *drops* below 10 VDC, the emitter voltage follows this decrease.

v. Eject (expel, blow or push out)
n. Ejection
p. From
In the event of overpressure, the disc is *ejected*.

v. Enter (put in, insert data)
n. Entry, Entrance
p. Into, In, On
The crew *enters* the coordinates in the INS.

v. Expand (increase in volume)
n. Expansion
An expanded scale displays the values in the middle range of the VSI.

v. Extend (stretch, make longer in space or time, occupy space)
n. Extension
p. To, Until, From
The avionics bay *extends* from frame 2 to frame 12.
v. FLOW (circulate [fluids, liquids])
n. FLOW
p. ALONG, THROUGH, INTO, OUT OF
The air flows inside a double skin which acts as a heat exchanger.

v. IMPART (communicate/transmit a force, a movement, etc.)
p. TO, FROM
The beam imparts the strain to the box structure.

v. INGRESS (move into, enter)
n. INGRESSION
Water may ingress the casing under pressure.

v. INSERT (place inside)
n. INSERT, INSERTION
p. INTO
INSERT the male plug into the socket.

v. LENGTHEN (make longer [re. shorten, widen, lighten, thicken, etc.])
n. LENGTH
The cable is lengthened to avoid strain.

v. LIFT (to raise, to move up, to carry)
p. UP, UP TO, INTO
Lift the aileron into position on the wing.

v. MANEUVER (operate, manipulate)
n. MANEUVER, MANEUVERING
Maneuver the flight controls with caution on the ground.

v. MOTOR (crank, rotate an engine)
n. MOTORING
Motor the engine to remove excess fuel.

v. POSITION (put in place, mount, set)
n. POSITIONING
p. IN, ON, INTO, ONTO
The engine is positioned under the pylon for mounting.
v. **PROTRUDE** (extend from, not to be flush)
p. **FROM, ABOVE, BELOW**
Overflow drains *protrude* from the side of the casing.

v. **REACH** (go as far as, attain, arrive at)
The a/c reaches Mach 0.85 in cruise.

v. **REDUCE** (decrease, diminish, make smaller)
n. **REDUCTION**
p. **FROM, TO**
The thrust is *reduced* during descent.

v. **RETARD** (move throttle levers backwards, reduce power, ≠ advance)
The throttles are *retarded* at Flare.

v. **RETRACT** (move back into a housing or stowed position, ≠ extend)
n. **RETRACTION**
p. **INTO**
The crew *retracts* the Slats and Flaps after the initial climb.

v. **REVOLVE** (turn around an axis, rotate)
n. **REVOLUTION**
p. **AROUND, ABOUT, ON, AT**
The gyros *revolve* at a constant speed.

v. **ROUTE** (lay out/install wiring, cables, piping, etc.)
n. **ROUTING**
p. **ALONG, IN, UNDER, OVER, THROUGH**
The control cables are *routed* under the cabin floor.

v. **RUN** (1. operate [machine, engine, company]; 2. extend in space)
n. **RUNNING**
The APU is *running* normally.
The fluorescent lights *run* along the ceiling.
v. SEND (dispatch, transmit)
p. TO, FROM, TOWARDS, BY
The transmitter sends a signal every 350 ms.

v. SHRINK (contract, ≠ expand)
n. SHRINKAGE
Once mounted, cooling enables the part to shrink to a tight fit.

v. SLIDE (move linearly along a surface)
n. SLIDE, ESCAPE SLIDE
p. ALONG, TO, FROM, IN
There is a sliding window on each side of the flight deck.

v. SPIN (rotate, revolve quickly)
n. SPINNER
The core spins at 10,500 R.P.M.

v. SPREAD (open or expand, extend, grow)
n. SPREAD
p. ALONG, THROUGHOUT, UP, DOWN
The surface corrosion is spreading along the shaft.

v. SURROUND (enclose, envelop, be around, encircle)
A doubler surrounds the fuselage.

v. SWEEP (move from side to side)
n. SWEEP
p. ACROSS, SIDE TO SIDE
The radar sweeps a 90° angle.

v. TILT (incline)
n. TILT
p. UP, DOWN, FORWARDS, BACKWARDS, SIDEWAYS
The radar antenna can be tilted up or down.

v. TOW (pull, haul, draw)
n. TOWBAR, TOWING
Tugs tow the aircraft from the hangar to the apron.
v. TRANSLATE (move sideways, shift)

n. TRANSLATION

p. FROM, TO

At low speed the position of the drive rod is translated.

v. TRANSMIT (send by radio, etc.)

n. TRANSMISSION, TRANSMITTER

p. TO, THROUGH, VIA

VHF messages are transmitted through two antennas on the upper and lower fuselage.

v. TRAVEL (move, be displaced)

n. TRAVEL

p. FROM, TO

The piston rod travels 40 cm.

v. TURN (move around an axis, rotate)

n. TURN

p. AROUND, ABOUT, CLOCKWISE, COUNTERCLOCKWISE

Turning the crank handle extends the gear in an emergency.

v. VIBRATE (oscillate, move quickly from side to side)

n. VIBRATION

If the engine vibrates, the vibration is detected by a pick-up.

v. WIND (move around an object, coil a cable, etc.)

n. WINDING

p. AROUND

Wind the cable around the drum.
3 WORDS AND EXPRESSIONS OF MOVEMENT

(See also Module B: LOCATION.)

RELATIVE MOVEMENT

with respect to
in relation to

The aircraft's position is computed with respect to/in relation to navigation beacons.

ROTATING MOVEMENT

about
around
clockwise
counterclockwise
on

A gyro rotates about its axis.
The air circulates around the cabin.
Rotate the handle six turns clockwise.
Turn counterclockwise to loosen.
The blades rotate on a shaft.

OSCILLATING MOVEMENT

alternating
side to side
reciprocating

alternating current
The radar sweeps from side to side.
The piston engine has a reciprocating movement.
Complete each of these sentences with one of the 50 verbs in the notes. Look at the example:

The hydraulic fluid \emph{flows} through a check valve.

1. \underline{} the safety pin on the nose gear.

2. A protective cover \underline{} the instrument.

3. It takes eight man-hours to \underline{} the unit.

4. The anti-shimmy prevents the nose gear from \underline{}.

5. When one pump fails, the pressure \underline{}.

6. Any leaking toilet fluid \underline{} along the side of the fuselage.

7. The window \underline{} in a groove or track.

8. To increase engine thrust, \underline{} the throttle levers.

9. \underline{} the guard to use the emergency switch.

10. Metal \underline{} in hot weather.

11. The APU should \underline{} 95% N1 in 25 seconds.

12. The rudder \underline{} 30° left and right.

13. The windshield wipers \underline{} the windshield.

14. Any new data is \underline{} in the computer.

15. The flap carriages \underline{} along the tracks.

16. The downlink \underline{} any messages to the ground.

17. The crew seats can be \underline{} up and down.

18. On a relay, the wire is \underline{} around the core.

19. You can \underline{} the pallets on the ball mat.

20. The wheels \underline{} more slowly on a wet surface.
21. The aircraft is .................................. onto its downwind leg.
22. The flaps are .................................. 25° for landing.
23. The cracks are .................................. at an alarming rate.
24. Hydraulic lines are .................................. down the gear leg.
25. .................................. the aircraft on the painted line.
26. If the filter is clogged, the flow .................................. it.
27. Cold weather causes metal to ..................................
28. .................................. speed from 350 to 280 knots.
29. After a hung start, the engine is ..................................
30. If the cargo door is not locked, indicators .................................. from the bottom of the door.

Find the verb of movement which refers to each item in the illustrations below. The first and last letters are marked. The first word has been completed for you.

2

1. DeflecT 2. R_____D 3. T_____T


121
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>10. S____E</td>
<td><img src="image" alt="Diagram" /></td>
<td>12. F____W</td>
</tr>
</tbody>
</table>

Diagram:
- A mechanical component with labels R, T, E, S, D, F, I, L, P.
In Module E we saw basic sentence structures:

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>VERB</th>
<th>OBJECT</th>
<th>MEANS</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The hot air</td>
<td>supplies</td>
<td>the slats</td>
<td>through the manifold</td>
<td>for leading edge de-icing.</td>
</tr>
</tbody>
</table>

But in the Description and Operation sections of many documents the passive is much used. The object and subject are inverted and the past participle of the verb is used with the verb to be:

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>VERB</th>
<th>AGENT</th>
<th>MEANS</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The slats</td>
<td>are supplied</td>
<td>with hot air</td>
<td>through the manifold</td>
<td>for leading edge de-icing.</td>
</tr>
</tbody>
</table>

*Passive sentences are impersonal. There is no mention of the person who does the action. Only the action or function is indicated:*

The mechanic checks the oil level. *(active)*
The oil level is checked. *(passive)*

The crew sets the cabin altitude. *(active)*
The cabin altitude is set. *(passive)*

The **PASSIVE** is also used with *can, must, shall, may, need, should, could, etc.* *(see Module M):*

The gear doors *can be opened* from the ground.
The circuit *must be connected* to the bus.
The flight controls *shall be cycled* before take-off.
Both wheels *need not be changed* if the damage to the tire is not serious.
The oil level *should be replenished* after each flight.
The aircraft *could be towed* from the main gear.

**Here are some more examples of active sentences and the equivalent passive forms:**
Trim Indicators provide indication of stabilizer position.
Indication of stabilizer position is provided by trim indicators.
Stabilizer position is indicated by trim indicators.
You must operate the Aileron Trim switches together.
The Aileron Trim switches must be operated together.
Secure the panel.
The panel must be secured.
A target operates the proximity sensor.
The proximity sensor is operated by a target.

**The passive verb can be followed by:**

<table>
<thead>
<tr>
<th>WORD</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>by</em> (the agent, the “doer”)</td>
<td><em>moved by</em> the servo</td>
</tr>
<tr>
<td><em>with</em> (the substance)</td>
<td><em>supplied with</em> air</td>
</tr>
<tr>
<td><em>from</em> (the origin)</td>
<td><em>controlled from</em> the flight deck</td>
</tr>
<tr>
<td><em>to</em> (the objective)</td>
<td><em>advanced to</em> increase thrust</td>
</tr>
<tr>
<td><em>to</em> (movement, connection)</td>
<td><em>attached to</em> the bulkhead</td>
</tr>
</tbody>
</table>

(See also Module B: LOCATION.)

**Note:** In Simplified English, the use of the Passive is limited as much as possible and not used in Procedures. For more information see Module X.
1. Fan air flow is controlled by the Fan Air Valve. (P)

2. (A wire) connects the unit to the ground. (A)

3. (The engineer) must inspect the air intakes for any damage. (A)

4. The control cables are activated by the outboard control valve quadrant. (P)

5. (The pilot) may display the weather image on the ND. (A)

6. The panel is maintained in place with three screws. (P)

7. (You) must set the master switch to OFF. (A)

8. (A device) monitors voltage and frequency. (A)
9. The servos are powered by three hydraulic systems. (P)

10. A stop limits drum travel. (A)

11. The EPR activates the take-off warning horn. (A)

12. The light is illuminated by an overtemperature. (P)

13. (You) can adjust the rudder pedals with a screw. (A)

14. The system is re-aligned by the RESET push-button. (P)

15. (The pilot) can rotate the trim wheel 3 turns in either direction. (A)

16. (The system) provides air leak detection on the hot air ducts. (A)

17. Smoke is detected by an optical sensor. (P)

18. (You) must safety and placard the thrust levers. (A)

19. Static electricity is transmitted by bonding jumpers. (P)

20. The C/B must be safetied. (P)
A process is a sequence of actions, movements, etc. Let us look at some of the ways in which these actions can be linked (connected).

These words / expressions introduce the next step in the sequence. (See also Module K: CONJUNCTIONS.)

**CAUSE AND EFFECT**

**RESULTING IN (+ -ing or substantive)**
The ground allows CR5 to be forward-biased, resulting in a reduced voltage appearing at the Cathode of CR6.

**THEREBY (+ -ing or substantive)**
The reduced voltage will not allow Zener diode CR2 to conduct, thereby removing all the AC voltage from the first and second amplifiers.

**TO RESULT IN, TO CAUSE**
A shorted resistor results in increased gain in the amplifier and causes an offset in the on-course readout.
SO (+ -ing)
A voltage divider provides the voltages necessary to forward bias CR21, so allowing the detector to operate in the linear portion of the characteristic curve of the diode.

THEN (+ present simple or future)
If the difference network in the monitor detects a difference in the two signal inputs, then the carrier output will rise to an amplitude sufficient to close gate No. 1.

THUS (+ -ing)
Any voltage deviation of more than 0.2 volts causes a signal to be sent to the sensor unit, thus triggering a warning.

PRESENT PARTICIPLE (+ -ing)
The shorted secondary receives an induced voltage by the action of the alternating armature flux, and the resulting current flowing through the turns of the compensating winding establishes the opposing magnetomotive force, neutralizing the armature reactance.

N.B. The present participle is used in three different ways in this sentence:
* a direct qualifier of a substantive or noun, as in “Landing Gear”;
** to describe an action in progress, i.e. “a current which flows through”;
*** in the sense of “thus” or “so”, introducing a consequence.

IN TURN
The decrease in current through Q22 results in the base-voltage of Q22-1 rising, which in turn decreases the current through Q22.

SEQUENCE IN TIME

WHEN
When K24 is energized, 27.5 VD is available at pin X of P2001.

ONCE, AS SOON AS (immediately, the moment something happens)
Once the 2800 Hz signal passes through the flag logic circuit, it is amplified as soon as the other conditions are fulfilled.

FIRST, SECONDLy, THEN,
AFTERWARDS, FINALLY
First the control lever is set to DOWN.
Secondly the First Officer checks that the amber lights illuminate. Then the doors open.
Afterwards the gears extend and finally the main doors close again.
FUNCTIONS

NOTES

(See also Module 1: PURPOSE.)

In this module, there are some expressions and words related to 12 common functions: QUANTITY, DURATION, HAPPENING, INDICATING, INFORMING, INSPECTING, COMPOSITION, COMPUTING, MAKING POSSIBLE, COMPLIANCE, PREVENTION, and EQUIPPING.

QUANTITY

<table>
<thead>
<tr>
<th></th>
<th>A or B</th>
<th>A + B</th>
<th>A or B or C or D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>one</td>
<td>both</td>
<td>any</td>
</tr>
<tr>
<td></td>
<td>either ... or</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A+B+C</th>
<th>X, X, X, X, X</th>
<th>A+B+C+D</th>
<th>A+B+C+D (individually)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>some</td>
<td>all</td>
<td>each</td>
</tr>
<tr>
<td></td>
<td>none</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a few / several

many (How many?)

much (How much?)

In an and-gate both inputs must equal 1.
In an or-gate either input may equal 1.
Each input is connected to the timer.
All the inputs are connected to the timer.
a few cans of oil/a little oil
DURATION

TO TAKE, TO LAST
A wheel change takes 50 minutes.
The flight lasts 2 hours.

FOR (+ a period)
They will test the equipment for six hours. (future)
The plane has been grounded for three days. (past to present)
The plane was grounded for a week. (past to past)

SINCE (+ a starting point in the past)
The plane has been grounded since Tuesday. (past to present)

AGO (to indicate the starting point in the past)
The plane was grounded three days ago.
(i.e. The plane was grounded on Tuesday.)

FROM ... TO (to delimit a duration)
The unit was on the test bench from 8 a.m. to 4 p.m.

UNTIL (to indicate the end of a period)
Troubleshooting lasts until the failure is identified.

N.B. During = a moment inside a larger period. It is usually followed by a “vague” period like “the day”, “the night”, “the flight”, “the overhaul”, “the test” etc.
The failure occurred during climb.

ELAPSED TIME (time from the initial moment of a process – engine start, take-off run, etc.)
When the engine N1 reached 98%, the time elapsed was 55 seconds.

HAPPENING

TO OCCUR, TO TAKE PLACE, TO HAPPEN, TO RECUR (to occur again)
Autopilot disengagement took place at FL290.
Disengagement recurred immediately after the pilot reset the engagement lever.
Generator short circuits happen in wet weather.

IN THE EVENT OF, IN CASE OF (to introduce the circumstances of an event [= “if there is”])
In the event of a hydraulic system failure, the P.T.U. is used.
The oxygen masks drop in case of cabin depressurization.
INDICATING

DISPLAY, INDICATE, READ, READING, SCALE

Rate of Climb is displayed on the V.S.I.
The V.S.I. indicates the Rate of Climb.
Rate of Climb is read on the V.S.I.

There is a Glide Slope display on the A.D.I.
There is a Glide Slope scale on the A.D.I.
There is a Glide Slope reading on the A.D.I.

INFORMING

NOTIFY, INFORM, ADVISE, REPORT, TELL

The Operations notify the Flight Crew of any changes in flight plan, meteorological conditions etc.
The NOTOC informs the crew of any restricted or dangerous cargo.
The EFIS advises the crew of the status of the aircraft.
The ground engineer reports any anomalies to the flight crew.
The coordinator tells the Captain when the passengers are ready to board.

INSPECTING

EXAMINE, INSPECT (both suggesting an overall viewing of a part or assembly for its general condition)
Examine/Inspect the condition of the external lighting.

CHECK (when you verify a particular value, etc.)
Check oil level.
Master Lever at ON ... Checked.

INVESTIGATE (a methodical research into the causes of a malfunction)
Remove the transponder and investigate in laboratory.

SCAN (to follow a predetermined route in order to check a series of values)
The First Officer scans the system panels. (re. scanning pattern)

TEST (to perform a sequence of actions to be sure something is operative)
Test the Fire Detection Loops.
COMPOSITION

COMPREISE, CONSIST OF
The assembly comprises G, H, I, J, K.
The assembly consists of G, H, I, J, K.

INCLUDE
The assembly includes M N O.

BE MADE UP OF (physical parts)
The gear is made up of a gear leg, a shock absorber, a boggie, two axles, four wheels etc.

BE BROKEN DOWN INTO (conceptual or organizational parts)
The Engineering Division is broken down into Maintenance, Overhaul, Material and Design.

COMPUTING

COUNT (add, record numbers)
n. (n. = noun) COUNTER
The Data Recorder counts the number of cycles.

COMPUTE, RECKON (calculate, perform complex operations using precise data)
n. COMPUTER, DEAD RECKONING NAVIGATION
The Maintenance Recorder computes the MTBF (Mean Time Between Failures).
The pilot can reckon his position without Navaids.

ESTIMATE, EVALUATE, ASSESS (a projected calculation about something that you cannot measure directly or very precisely)
n. ESTIMATION, EVALUATION, ASSESSMENT
You can estimate the time of arrival. (ETA)
The number of manhours can be assessed.
9 MAKING POSSIBLE

Several verbs are used to express making a function or action sure or possible. They are often interchangeable, but the structure of the sentence may change.

PROVIDE, ENSURE, ASSURE (give, furnish, make sure)
The rocking lever provides/ensures/assures electrical pitch trim control.
The CSD provides/ensures/assures constant generator speed.

PERMIT, ALLOW, ENABLE (make possible)
The rocking lever permits/allows/enables the pilot to control the pitch trim electrically.
The CSD permits/allows/enables the generator to rotate at a constant speed.

10 COMPLIANCE

When the Authorities issue an Airworthiness Directive (AD) or a manufacturer a Service Bulletin (SB) etc., the operator (i.e. the airline or carrier) must respect it.

He enforces or obeys the Directive. He complies with or conforms to the instructions.

He applies or embodies (i.e. to incorporate) the Service Bulletin on the aircraft by carrying out or performing the modifications.

11 PREVENTION

AVOID (keep away, go around, bypass, dispense with)
n. AVOIDANCE
The center tank avoids making a “tech stop” for refueling on long flights.

PREVENT (stop something from happening)
n. PREVENTION
Probe heating prevents the probes from icing up.
These verbs indicate that a component is part of an assembly.

**EQUIP, FIT, PROVIDE, MOUNT**

The Outflow Valve is *equipped* with a Vacuum Relief Diaphragm.
The Outflow Valve is *provided* with a Vacuum Relief Diaphragm.
The Outflow Valve is *fitted* with a Vacuum Relief Diaphragm.
A Vacuum Relief Diaphragm is *mounted on* the Outflow Valve.

* Double the P and the T before adding -ed.
Complete each sentence with one of the words in the Notes section of this module. Often there is more than one possibility. For example:

The LIGHTS control panel is PROVIDED/FITTED/EQUIPPED with a Dimming Knob.

1. ................................ the ground power phase sequence.

2. The hydraulic system ................................ of 3 independent systems.

3. The crew must ................................ their trip fuel.

4. ................................ the engines and APU have fire detection loops.

5. Turnaround ................................ 45 minutes.

6. The secondary flight controls ................................ the spoilers.

7. Birdstrikes usually ................................ during take-off or approach.

8. The Mode Annunciator ................................ the crew of the autopilot modes engaged.

9. A valve on the wing undersurface ................................ the tanks to be drained.

10. The circuit is ................................ before each flight.

11. In the ................................ of computer failure, the standby instruments are used.

12. The ADI ................................ the aircraft attitude.

13. How ................................ fuel do you need?

14. The anti-skid system ................................ the wheels from locking.

15. The Audio Control Panel is ................................ on the center pedestal.

16. The indicator ................................ 400 ft/min.

17. The radar ................................ the airspace in front of the airplane.

18. Quiet hours are ................................ 23.00 ................................ 06.30.
19. channel 1 or channel 2 may lead.

20. The is graduated every 10 knots.

21. The Flight Engineer the ground crew of any failures.

22. The modification shall be by January 31st.

23. pilot has an oxygen mask.

24. the tires for cuts, wear and general condition.

25. the night, the main gear wheels are chocked.

26. The illumination of the caption light an overheat.


28. The box only a few minutes to warm up.

29. The Fire Handle is with a built-in warning light.

30. The instinctive disconnect push-buttons the pilot to take over.
STATES, FAILURES, DAMAGE

FRAMES
PRESSURE
BULKHEAD

STRINGERS

DOUBLERS

DRAIN MAST
ACCESS
DOOR

EXHAUST

LAVATORY

A.P.U. MOUNTS

TRIMMABLE
HORIZONTAL
STABILIZER

TAIL CONE
NOTES: STATES

State or action completed:

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>TO BE</th>
<th>PAST PARTICIPLE/ADJECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The circuit</td>
<td>is</td>
<td>closed.</td>
</tr>
<tr>
<td>The slats</td>
<td>are</td>
<td>extended.</td>
</tr>
<tr>
<td>The autopilot</td>
<td>is</td>
<td>armed.</td>
</tr>
<tr>
<td>The tank</td>
<td>is</td>
<td>full. (adj.)</td>
</tr>
</tbody>
</table>

Action in progress:

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>TO BE</th>
<th>PRESENT PARTICIPLE/ADJECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The light</td>
<td>is</td>
<td>flashing.</td>
</tr>
<tr>
<td>The doors</td>
<td>are</td>
<td>extending.</td>
</tr>
</tbody>
</table>

In Technical English, the present participle form is not frequent.

Here are some common states or conditions grouped in twelve general categories.

AIRCRAFT

BANKED (inclined laterally or tilted)
The a/c is banked during a turn.

CLEAN (with all secondary flight controls and gear retracted)

NOSE-DOWN, NOSE-UP (down or up pitch attitude of the aircraft or the stabilizer)
The nose-up attitude is read on the ADI scale.

STEADY (regular, continuous, without change in configuration or velocity)
Cruise is steady, level flight.
2 BRAKES

APPLIED, SET, ON (pressure on the brakes, operating, pedals pushed)
The brakes are applied during roll-out.
Parking brake set.

RELEASED (pressure removed from brakes)
The parking brake is released for pushback.

HOT (high temperature)
If the brakes are hot the brake fans are switched on or the firemen spray them with water.

3 ELECTRICAL CIRCUITS, NETWORKS

CLOSED (electrical continuity, the current flows)
When the microswitch is closed a signal is sent to the landing gear computer.

COLD (not energized, without electrical power)
When the engineer arrives the a/c network is cold.

EARTHED, GROUNDED (connected to the aircraft earth or ground)

ENERGIZED, HOT (the circuit, network or a/c is supplied with electrical power, ≠ COLD, DE-ENERGIZED)
The circuit is energized by the ON/OFF push-button.

OPEN (no electrical continuity for a circuit, contact, switch or relay)
The switch is open and the circuit de-energized.

SHORTED, SHORT-CIRCUITED (accidental contact between two points on a circuit)
The circuit may be shorted by faulty insulation.

SHUNTED (current following an alternative path)
The rheostat controls the amount of current shunted.
**4 CIRCUIT BREAKERS, SELECTORS**

PULLED (circuit opened manually)

SAFETIED (breaker maintained in open position by a clip; also used for any other control, switch, lever etc.)
Circuit Breaker 16 xy shall be pulled and safetied before any work is performed on the system.

SET (1. ≠ PULLED: Circuit Breaker in closed position, 2. Selector or switch positioned, placed)
The switch is set at ON.

TRIPPED (breaker opened automatically or manually)
In the event of overvoltage the C/B is tripped.

---

**5 DATA, COMPUTERS**

BACKED UP (supported by an alternative, redundant system which can take over)
Channel 1 is always backed up by Channel 2.

CLEARED (information or display removed, erased, deleted)
The screen is cleared automatically by the next operation.

DEBUGGED (problems, malfunctions removed)
Each unit is debugged before acceptance testing.

ISSUED (given, published, distributed)
The latest status is issued by the recorder.

ON-LINE, OFF-LINE (directly linked to the mainframe computer, or not)
These operations are performed off-line and integrated later.

SAFEGUARDED (protected from memory loss)
Each step is safeguarded against micro power cuts and faulty operations.

STORED, MEMORIZED (maintained in memory)

UPDATED (modified to conform to the most recent status)
The values have been updated in issue 5.

UPGRADED (modified to a better or higher level)
In the upgraded mode, there are more functionalities.
**DOORS, VALVES, ETC.**

**CLOSED, SHUT (≠ OPEN)**  
All doors must be shut before departure.

**CLOSING, OPENING, IN TRANSIT**  
(a valve or door in movement)  
The amber lights indicate that the gear doors are opening or closing.

**DEPLOYED (extended, unfolded, out)**  
The thrust reverser doors are deployed during landing roll-out.

**FLUSH (level with the adjacent structure, forming a continuous profile)**  
When the cargo doors are locked, the indicators must be flush with the skin.

**LATCHED, LOCKED (fastened, secured, maintained in position)**  
The proximity switches sense that the doors are closed and locked.

**LOCKED (when screw etc. has received final turn)**  
Check that clamp screws are tightened and locked.

**SEATED (for a valve, in contact with its seat or base)**

**STOWED (≠ deployed, enclosed in a compartment, etc. ready for use e.g. Landing Light, Escape Slide, Life Vest, Thrust Reverser Doors, etc.)**  
At 60 kt. the reverser doors are stowed.

**TORQUED (tightened, screwed to a precise value)**  
The Bolts are torqued to 4,000 in-lbs.
FITTINGS

FASTENED, SECURED, TIGHT (fully or correctly attached, without movement)
Check that access panels are closed and secured.

LOOSE (≠ tight; also for a cable with insufficient tension)

SAFETIED (maintained fully secured with lockwire, etc.)
The master switch is safetied.

FLIGHT CONTROLS, LANDING GEAR

DEFLECTED (moved up or down, or from side to side, for control surfaces that move about an axis or neutral position [ailerons, elevators, rudder, trim])
The trimmable horizontal stabilizer is deflected 4° nose-up.

EXTENDED, DOWN, OUT (Flaps, Slats, Spoilers, Airbrakes, Landing Gear in operating position)
The spoilers are extended asymmetrically for turn coordination.

RETRACTED, UP, IN (≠ extended, down)
The flaps are up at VF.

TRIMMED (in an attitude where the aircraft is balanced for flight)

INDICATORS, WARNINGS

BLINKING (intermittent mechanical movement, like an eye)
The blinking of the fish-eye indicates oxygen flow.

CANCELLED (stopped, suppressed)
The audio warning is cancelled by this p.b.

CROSS-LINE
DELETED

DIMMED (reduced brightness)

EXTINGUISHED (off, a light or indicator which is not activated)

FLASHING (intermittent illumination)
A flashing light attracts the crew’s attention.

ILLUMINATED (on)
The Light is illuminated, the GPU can be cut in.

INHIBITED
The amber warnings are inhibited by the T/O inhibit pb.

IN-LINE

PULSING (regular change in intensity)

STRIPED/AMBER

REVERSE VIDEO (inscription against a different background)

10 PUSH BUTTONS

PRESSED
(pressed and maintained)

HELD

RELEASED
(pressure removed)

RESET
(pressed again)
SYSTEMS

ACTIVATED (made active, operational)
The fan is activated by an increase in temperature.

ARMED (ready to operate automatically, e.g. Autopilot, Ground Spoilers, Escape Slide, etc.)

DUMPED (dropped [fuel], unloaded [pump])
In the event of failure, the pump is dumped.

ENGAGED (operating)
The Autopilot is engaged in Climb.

ISOLATED (to be separated, cut off, disconnected from the rest of the system)
In the event of jamming, the servo is isolated.

MONITORED (supervised, watched, followed)
The valve position is monitored by a feedback system.

SLAVED TO (directly controlled by, dependent on)
The aircraft symbol is slaved to the computer output.

STANDBY (permanently ready to take over from the operating system in the event of failure or change, redundant)
At STBY, the ATC transponder is electrically supplied, but not operating.

TANKS
VENTED (connected to the atmosphere)
The tanks are vented through the Vent Pipes.

FROZEN
Water in the tanks may be frozen in cold weather.
Use these words to fill in the blanks in the 20 sentences below.

CLEARED  APPLIED  TORQUED  HOT
TRIPPED  EARTHED  SHUT  SET TO
FULL  OPEN  FLASHING  RELEASED
SAFETIED  CLEAN  HELD  IN TRANSIT
SECURED  ARMED  FLUSH  DEPLOYED

1. The wheel brake is ........................................ upon an order from the anti-skid.

2. When the flaps are retracted the aircraft is ........................................

3. A short circuit can cause the circuit breaker to be ........................................

4. The main gear is ........................................ with a locking sleeve during a night stop.

5. The Doors panel shows that all the doors are ........................................

6. The Amber magnetic indicator position shows that the valve is ........................................

7. The screw must be ........................................ to 250 m.N.

8. The push-button is pressed and ........................................ until the light illuminates.

9. With the G.P.U. connected, the aircraft is ........................................

10. The system is ........................................ through a bonding strip.

11. ........................................ the circuit breaker to ........................................ the circuit.

12. The rotary selector is ........................................ A + B.

13. The screen can be ........................................ by pressing the CLR Key.

14. When the thrust reverse levers are pulled, the reverser doors are ........................................

15. The lockers are ........................................ with a cotter pin.

16. The ground spoilers are ........................................ before landing.

17. Replenish the oil level so that the tank is ........................................
18. During the pre-flight check, the parking brake is

19. The warning lights may be steady or

20. Check that all the doors and surfaces are with the fuselage.

Find the terms which agree with these definitions. You have the number of letters in each word. Look at the example:

tightened to a precise value (7) torqued

1. the contrary of “deployed” (6)

2. OFF or ... (light) (12)

3. set to initial position (5)

4. computer operation protected (11)

5. improved, made better (8)

6. “earthed” or ... (8)

7. a synonym of “memorized” (6)

8. positive a/c pitch attitude (6)

9. the contrary of “tight” (5)

10. cut off from the system (8)
NOTES: FAILURES, DAMAGE

In the second part of this module, you will find some common terms used to describe failure and damage, grouped in families of systems:

Structures used to express failures:

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>TO BE</th>
<th>PAST PARTICIPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The leading edge</td>
<td>is</td>
<td>damaged.</td>
</tr>
<tr>
<td>The supports</td>
<td>are</td>
<td>cracked.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THERE IS/ARE</th>
<th>SUBSTANTIVE</th>
<th>COMPONENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is</td>
<td>damage</td>
<td>to/on the leading edge.</td>
</tr>
<tr>
<td>There are</td>
<td>cracks</td>
<td>on the supports.</td>
</tr>
<tr>
<td>There is</td>
<td>a cut</td>
<td>on the tire.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>TO HAVE</th>
<th>SUBSTANTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The supports</td>
<td>have</td>
<td>cracks.</td>
</tr>
<tr>
<td>The tire</td>
<td>has</td>
<td>a cut.</td>
</tr>
</tbody>
</table>

GENERAL

Technical anomalies

UNUSUAL CONDITION THAT COULD CAUSE A FAILURE

MALFUNCTION

INCORRECT OPERATION

FAULT

PARTIAL LOSS OF FUNCTION

INCIDENT

EVENT CAUSED BY A FAULT, ETC.

FAILURE

LOSS OF AN ASSEMBLY, COMPONENT OR SUBSYSTEM

ACCIDENT

INCIDENT AFFECTING THE AIRCRAFT
Danger to human life

Minor defects

DOWNGRADING (loss of quality, drop in status, decrease in capacity)
If the upper modes are lost, the system is downgraded.

DRIFT, DEVIATION (departure from the planned course or planned value)
There is a 2% drift in reception.

INACCURACY (absence of precision)
The inaccuracy of the radio bearing caused the a/c to be off course.

POOR (bad, insufficient)
VHF reception is very poor. You must repeat all the message.

OUT-OF-TOLERANCE (exceeding the permissible limits)
The clearance of 2.5 mm is out-of-tolerance. The tolerance is ±1.5 mm.

AERODYNAMICS, THERMODYNAMICS

BUFFETING (rapid turbulence)

INGESTION (bird, stone, object going into the engine)
There was a bird ingestion on engine N° 2 at 200 ft.

STALL (1. loss of aircraft lift; 2. loss of engine flux)
Stall may be caused by an excessive nose-up attitude at low speed.

SURGE (engine stall, resulting in violent vibrations and noise)
WET START, HUNG START (engine start with no “light off”, i.e. ignition; no flame is obtained, or insufficient speed)
After a wet start, cranking is performed.

WINDSHEAR (violent cutting movement of the wind, stress on a/c caused by different wind velocities and directions)
Windshear caused the loss of Flight 66.

3 ELECTRICAL

NOISE (unwanted signal or frequency disturbing transmission or output)

OUT-OF-PHASE (not in phase)

OVERVOLTAGE (excessive voltage value, ≠ UNDERVOLTAGE)
126 VAC is overvoltage for a 115 VAC system.

SHORT, SHORT CIRCUIT (unwanted contact between two wires, terminals, etc.)

TRANSIENTS (a short oscillation caused by a sudden change in voltage or current)

4 FLUIDS

CONTAMINATION (undesired materials mixed with substance)
There is detergent contamination in the potable water system.

LEAK (an accidental hole or crack through which fluid escapes)
There is a leak on the hot air duct.

LEAKAGE
(the fluid that passes through the leak, the phenomenon of leaking)

OVERFILL (filled too much, fill above the maximum level)

OVERFLOW (the flow of fluid caused by an overfill)

OVERHEAT (be too hot, be dangerously hot)
Brake overheat triggers the BRAKES HOT light.

OVERPRESSURE
(excessive pressure, too high a pressure)
The HI PRESS light illuminates in the event of overpressure...
OVERTEMPERATURE (high temperature but less high than “overheat”)

SEEPAGE (n), SEEP (v) (gradual leakage causing a film or thin layer of fluid.

SPILLAGE (n), SPILL (v) (result of leakage, fluid falling onto the ground, etc., = overflow)
If the automatic shut-off does not operate there may be a fuel spillage.

STAIN (dirty mark)
The lower fuselage often has blue stains made by toilet servicing fluid.

SURGE (irregular flow or movement of fluid, a transient rise, a sudden change in pressure, etc.)
The Surge-Vent tank is designed to absorb the effect of fuel surges.

MECHANICAL

CHAFING, RUBBING (wear or damage caused by friction)
If the clamps are loose, vibration may cause chafing on the pipes.

JAM, JAMMING, JAMMED (impossibility to move; seizing, locking)
In the event of a flap jam, the flaps cannot be extended or retracted.

LOCKING, LOCKED (1. normal fastening, e.g. door; 2. moving parts maintained fixed)
Excessive brake pressure causes wheel locking.

MISSING (absent)

SHEAR (rupture, break, cut)
A shear pin is fitted on the tow-bar.

STIFFNESS, STIFF (ADJ.)
difficult to move
Without lubrication, the mechanism may be stiff.

WEAR, WORN (the result of friction or use, the loss of surface qualities)
After 2,000 cycles, the assembly shows signs of wear.
CHIP/CHIPPED
CORROSION/CORRODED
CRACK/CRACKED
CRAZING (GLASS)/CRAZED

DENT/DENTED
DISTORTION/DEFORMATION/DISTORTED
F.O.D. (FOREIGN OBJECT DAMAGE)
LIGHTNING STRIKE
PEELING/PEELED

SCRATCH
(superficial, linear damage removing small quantity of surface material)

STRIKE
(impact by foreign object – bird, stone, lightning, etc.)
7 Tires (US) / Tyres (GB)

Blister  Burst  Cut  Tear

Peeled Rib  Skid  Tread Chunking  Tread Thrown
Try and recognize the damage or failure from the description. You are given the first letter of each word. Look at the example:

State of tire without pressure. **deflated**

1. Damage caused by lightning. L S
2. Temporary oscillation. T
3. When flight controls are hard to move. S
4. Interference to radio signals, etc. N
5. The crew reports any problems or ... I
6. Not in correct form. D
7. No engine ignition. W S
8. Undesired electrical contact. S
9. Object going into the engine. I
10. Rupture, breakage. S
11. The result of friction. C
12. A bird strike on the leading edge causes this. D
13. To leave correct path or value. D
14. Not in correct phase sequence. O O P
15. Oil in fuel, for example. C
16. Dangerous to humans. H
17. When flight control surfaces cannot move. J
18. This could cause cylinder discharge. O
19. Loss of some functions, etc. D
Find the words in both parts of Module S which refer to the illustrations below. You have the first letter, the number of letters that follow, and the associated system, etc. Number One has been done for you.

1. Circuit Closed
2. Door L ______
3. O O Phase
4. Autopilot A ______
5. Tire W _____
6. Aircraft B ______
7. Brakes A ______
8. Tire C ___
9. Breaker S __________
10. Fuel L
11. D on Leading Edge
12. Tank F
13. Thrust Reverser D
14. M.I. C L
15. Lightning S
16. Window C
17. P/B R
18. Pin S
REVIEW THREE

Look at the twenty-five cockpit controls and instruments (throttle levers, magnetic indicator, etc.). Write their names in the spaces on the following page.
2 Put together (match) these technical words in pairs of contraries. Look at the example:

PULL ≠ PUSH

| INOPERATIVE | LOOSE | LOW | EMPTY | TWIN, DOUBLE |
|[classic|TRIP | PULL | OPEN | INSERT |
|[class|TAKE-OFF | DE-ENERGIZE | INSTALL | STOW |
|[class|LOosen | HOLD | EXHAUST | OUTER |
|[class|LOWER | TAIL | OUTGOING | INCREASE |
|[class|COUNTERCLOCKWISE | TOP UP | LOWER | APPLY |

TIGHTEN ≠ REMOVE
DECREASE ≠ AIR INTAKE
CLOSE ≠ HIGH
OVER ≠ EXTRACT
PUSH ≠ RELEASE
UPPER ≠ GO AHEAD
DEPLOY ≠ ENERGIZE
SET (C/B) ≠ INNER
INCOMING ≠ FULL
SERVICEABLE ≠ DRAIN
CLOCKWISE ≠ TIGHT
SINGLE ≠ LANDING
NOSE ≠ RAISE
ON ≠ ROOT
3 Group these different types of failure, damage, malfunction, etc. under the right heading, as in the example.

OUT OF PHASE = ELECTRICAL POWER

<table>
<thead>
<tr>
<th>OUT OF PHASE</th>
<th>F.O.D.</th>
<th>OVERHEAT</th>
<th>LEAK</th>
<th>JAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEAR</td>
<td>BLISTER</td>
<td>OVERFLOW</td>
<td>SHORT CIRCUIT</td>
<td>BIRD STRIKE</td>
</tr>
<tr>
<td>SHEARED</td>
<td>CLOGGED</td>
<td>DEFLATED</td>
<td>LOCKED</td>
<td>DENT</td>
</tr>
<tr>
<td>CRACK</td>
<td>STAIN</td>
<td>SURGE</td>
<td>SEEPAGE</td>
<td>PEELING</td>
</tr>
<tr>
<td>CUT</td>
<td>STALL</td>
<td>NOISE</td>
<td>CHAFING</td>
<td>TARNISHED</td>
</tr>
<tr>
<td>SCRATCH</td>
<td>STIFF</td>
<td>CHIP</td>
<td>RUNAWAY</td>
<td>OVERLOAD</td>
</tr>
<tr>
<td>CRAZING</td>
<td>VIBRATION</td>
<td>CORROSION</td>
<td>CONTAMINATION</td>
<td>HUNG START</td>
</tr>
<tr>
<td>CUT</td>
<td>FIRE</td>
<td>RUBBING</td>
<td>PLAY</td>
<td>LOOSE</td>
</tr>
<tr>
<td>FRETTING</td>
<td>FLASHOVER</td>
<td>SHUTDOWN</td>
<td>TRIPPED</td>
<td>DISCHARGE</td>
</tr>
<tr>
<td>BLOWN</td>
<td>CHUNKING</td>
<td>IMBALANCE</td>
<td>TRANSIENTS</td>
<td>MISSING</td>
</tr>
<tr>
<td>DISTORTED</td>
<td>SKID-MARK</td>
<td>TEAR</td>
<td>OVERSPEED</td>
<td>ASYMMETRY</td>
</tr>
<tr>
<td>CRAZING</td>
<td>FLAME-OUT</td>
<td>BURST</td>
<td>DRIFT</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>AIR CONDITIONING</th>
<th>ENGINE</th>
<th>STRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

160
<table>
<thead>
<tr>
<th>TIRES</th>
<th>ELECTRICAL POWER</th>
<th>FLIGHT CONTROLS</th>
</tr>
</thead>
</table>

4. Choose the correct verb (A, B, or C) for each sentence. Sometimes you must look at the form of the verb (past participle, present, etc.). Remember that even the "incorrect" verbs in each sentence are interesting. You should know them.

1. The doors are closed and ........................................
   A. shut
   B. locking
   C. locked

2. Check and ........................................ the oil level.
   A. top up
   B. complete
   C. fill

3. Before departure you must ........................................ the logbook.
   A. report to
   B. sign
   C. clear
4. Refueling is  
A. replenished  
B. overflowed  
C. completed 

5. ......................... your work in the logbook.  
A. Refill  
B. Fill in  
C. Fill 

6. ......................... the safety pin.  
A. Introduce  
B. Enter  
C. Insert 

7. Drain, ...................... and refill the gearbox.  
A. spray  
B. flush  
C. de-ice 

8. ......................... the escape slide lever.  
A. Disarm  
B. De-arm  
C. Unarm 

9. The failure ...................... at 3000 feet during climb.  
A. became  
B. arrived  
C. occurred 

10. ...................... with lock wire.  
A. Safety  
B. Stain  
C. Seal 

11. Before performing the test, ...................... C/B 6XX.  
A. trigger  
B. dump  
C. trip
12. the panel with Dzus fasteners.
A. Stow  
B. Slide  
C. Secure

13. The blue system failed, but the crew the flight.
A. stayed  
B. overrode  
C. pursued

14. The oxygen cylinder disc has .
A. popped out  
B. tripped  
C. jacked up

15. In case of fire, the A.P.U.
A. cut out  
B. cut in  
C. shut down

16. The switch is at Loop A.
A. setting  
B. selected  
C. set

17. We have oil samples from Engine 1.
A. take  
B. taking  
C. taken

18. The controls are safetied and during the test.
A. noticed  
B. placarded  
C. reported

19. We have a new proximity detector.
A. energized  
B. fitted  
C. switched
20. We have ....................... metal filings on the magnetic plug.
   A. found
   B. find
   C. finding

21. The failure was ....................... by a short circuit.
   A. performed
   B. occurred
   C. caused

22. We are ....................... the parameters on that engine.
   A. monitoring
   B. operating
   C. steering

23. The brake wear indicator is ....................... 
   A. troubleshooting
   B. protruding
   C. overriding

24. We have checked and ....................... all the clamps to stop chafing
   A. loosened
   B. lost
   C. tightened

25. Two of the six fasteners were ....................... . We have replaced th
   A. handling
   B. lubricating
   C. missing

26. “Can you ....................... the engine oil, please?”
   A. dip
   B. drip
   C. drop

27. To check the failure on unit N° 1, we ....................... units 1 and 2.
   A. topped up
   B. backed up
   C. crossed over
28. .................................. the PTT push-button to perform the test.
   A. release
   B. depress
   C. pull

29. The damage .................................. bleed valve de-activation according to MEL and AMM 
    to operate the flight.
   A. requested
   B. required
   C. released

10. The ELEC master warning light was ..............................
    A. tripped
    B. triggered
    C. discharged
This page intentionally left blank
T. CONNECTIONS
U. INSTALLATION
V. UNITS
W. FALSE FRIENDS
X. SIMPLIFIED ENGLISH
Y. MAINTENANCE WORDS
Introductio

In this last part of the Documentation Handbook we do three things:

1. Look at the last two important technical functions: CONNECTIONS (Module T) and INSTALLATION (Module U) that we started covering in Part Three.

2. Give you some practical information and some more verb vocabulary in UNITS, NUMBERS, ABBREVIATIONS (Module V), FALSE FRIENDS (Module W) and MAINTENANCE WORDS (Module Y).

3. Give you some general information about the basic principles of SIMPLIFIED ENGLISH (Module X) used on the latest generation of aircraft and about how you can continue to improve your reading ability: TIPS FOR FURTHER READING (Module Z).

Review Four on p. 213 is an opportunity to revise all the things we have seen since the beginning of the book.

If you have read the Handbook, and especially if you have done all the exercises, you should find your documentation easier to use. Above all we hope you find it clearer, i.e. you know what to look for, where to look for it and what it means.

Remember that learning is not just something you do with a teacher and an “English book”. Each time you use a manual at work you are in a position to consolidate what you have learned and learn more by using the principles and methods contained in the Handbook.

Finally, although all the examples are taken from aeronautical documentation, the basic language explained in Parts One and Two is the same language as general, everyday English.
CONNECTIONS

MOUNTS

TERMINAL

SCREW NUT WASHER

BONDING JUMPERS

UNIONS

WIRING

DRUM ASSEMBLY

DRUM ASSEMBLY TURNBUCKLES

RIVETING CLEATS
Like STATES and DAMAGE (see Module S and C), the past participle often expresses connections between components. It follows the verb to be. e.g.

The fire detection system is connected to the Master Warning Controller.
The cabin seats are attached to floor rails.
The flight crew is/are linked to the ground by VHF.
The engine is mounted on a pylon.
The landing gear control unit is interfaced with several systems.

Together indicates a reciprocal connection, e.g.
The two parts of the seat belt are fastened together.

There is/there are can also introduce a substantive or name to express the type of connection. Between and and often indicate the connection, e.g.
There is a connection between the Fire Detection System and the Master Warning Controller.
There is a VHF link between the flight crew and the ground.
There is an interface between the landing gear control unit and several systems.
There is 3 mm. play between the door and fuselage.

1 GENERAL CONNECTIONS

CONNECTED TO (electrical or mechanical connections)
The Utility Bus is connected to the Essential Bus.
The hand mikes are connected to the side consoles.

INTERCONNECTED (connected together and acting on each other)
The Capt. and F/O control columns are interconnected.
INTERSECT (cross, meet)
Runways 35 and 27 intersect.
The two curves intersect at the critical point.

LINKED (physical or radio connection)
The gear leg and shock absorber are linked by scissors.
The aircraft are linked to their base by the Company frequency.

RELATED TO (abstract connection, cause, effect, etc.)
The power setting is related to the take-off weight, the Outside Air Temperature and the altitude of the field.

2 ELECTRICAL CONNECTIONS

INTERFACE (verb or noun) (contact; the point where two systems, computers, etc. are connected)
The DFDR interfaces the FDIU.
There is an interface between the DFDR and the FDIU.

ON LINE (connected to a power supply or a data network [computer etc.])
The engine generator must come on line to supply the aircraft network.
The terminal is on line and the transactions are performed in real time.

TIED (attached with a rope, cable, etc.; when two parallel bus-bars are connected)
The BUS TIE push-button enables the main buses to be tied.

WIRED (connected with wires or cables)
The Wiring Diagram shows how the circuits are wired.
The switch guards are wired to the instrument panel.
ATTACHED ([general term] connected, mounted, installed)
The overhead racks are attached to the ceiling.

CLEARANCE (the distance between a moving object and another – fixed – object)
Ground clearance is the distance between the bottom of the engine and the ground.
Fan Blade clearance is the distance between the tip of the fan blades and the casing.

FASTENED (attached, secured, maintained in position [usually unfastened easily])
The seat belts are fastened during take-off and landing.

FITTED (precisely installed, mounted [permanent installation])
The cross beams are fitted to the frames.

FIXED (attached)
The Map Light is fixed to the flight deck wall on a bracket.

HANG, HUNG (suspend, suspended)
For installation, the engine is hung from a hoist.

HINGED (articulated on free-rotating connection)
The Rudder is hinged on the Vertical Stabilizer.
HOOKED (maintained in position by a hook or latch)
The gear doors are hooked by an uplock box.

INSTALLED ([most general word of connection] mounted on, fitted to)
The APU is installed in the tail cone.

MATED (joined together, two matched surfaces connected)
The wings are mated on the wing center box.

MOUNTED (installed + on, under, above, below, over, etc.)
The radionavigation antennas are mounted on the fuselage centerline.

PLAY (distance of free movement [see also clearance])
The PLAY in the mechanism must not exceed 3 mm.

SPLICED (joined by mixing or superimposing cables, structure, etc.)
The cables were spliced to increase their length.
Complete this crossword of "connection" words. Two words are there already. Find the other words from these definitions. The number of letters is in brackets.

1. Distance a part can move. (4)
2. Connected together and acting on each other. (14)
3. Suspended. (4)
4. To install permanently and with precision. (3)
5. When two wires are connected. (7)
6. To cross. (9)
7. Abstract connection, e.g. influence, cause and effect, etc. (7)
8. Two surfaces joined. (5)
9. Connected by radio. (6)
10. Distance between a moving object and another. (9)
11. Articulated. (6)
12. Maintained in position but can be quickly unlocked. (8)
13. When two busbars are connected. (4)
14. Connection between two units. (9)
15. Installed on. (7)
Different connections are illustrated below. Identify them without looking at
the notes in this Module. Example 1 has been done for you.

1. MOUNTED
2. I ----- T
3. W ___ D

4. Suspended or H _ G
5. P _ Y
6. I ______ E
   between 2 units

7. Ground C ______ E
8. F ____ D
9. H ___ D

10. Flight Controls
    I __________ D

11. F ____ D
12. Cables S ____ D

13. Bus-bars T _ D
14. H ____ D
15. Generator O L E

175
INSTALLATION

- Escape rope storage
- Overhead outlet
- Ceiling light
- Assist handle
- F/O boomset storage
- F/O boomset jack panel
- Reading light
- Loudspeakers
- Nose wheel steering
- Checklist storage
- Oxygen mask
- Air conditioning outlet
- Waste bin
- Hand microphone
- Flash light
- Sliding tables (optional)
- Normal checklist storage
- Briefcase storage
- Flight document storage
- Ashtray
- Roll-up blind
- Oxygen mask
- Checklist storage
- Waste bin
NOTES

This module describes some of the expressions which are used with the verbs in Modules L and T. They correspond to different types of installation. There are:

ADJECTIVES
twin, airtight, shock-proof, retractable, adjustable, airborne, axial, failsafe, grease-free.

PRESENT PARTICIPLES
overlapping, self-locking, sliding, vibration-isolating, rotating, retaining.

PAST PARTICIPLES
self-held, self-contained, reinforced, grounded, sealed, air cooled, spring-loaded.

SUBSTANTIVES OR NOUNS
swivel, wing-to-fuselage, two-spool, toggle, time-delay, test, series, quick-disconnect, gimbal, plug-type.

VERBS
tie-down, stop, push-pull, plug-in.

CATEGORIES OF WORDS

-ABLE
-able at the end of an action = can be, able to be:

<table>
<thead>
<tr>
<th>EXPRESSION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>adjustable (fitting) (rod)</td>
<td>can be adjusted</td>
</tr>
<tr>
<td>heat shrinkable (rod)</td>
<td>can be retracted after heating</td>
</tr>
<tr>
<td>interchangeable (black box)</td>
<td>can be exchanged</td>
</tr>
<tr>
<td>line-replaceable (unit)</td>
<td>can be replaced in line</td>
</tr>
<tr>
<td>retractable (gear)</td>
<td>can be retracted</td>
</tr>
<tr>
<td>rotatable (parts)</td>
<td>can be repaired and returned to service</td>
</tr>
</tbody>
</table>
-ED, etc. (PAST PARTICIPLE)
The past participle indicates the result of an action, or how the action is performed:

<table>
<thead>
<tr>
<th>PARTICIPLE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>air-cooled</td>
<td>cooled by air</td>
</tr>
<tr>
<td>built-in (test)</td>
<td>incorporated, included</td>
</tr>
<tr>
<td>engine-driven (generator)</td>
<td>an engine drives it</td>
</tr>
<tr>
<td>ground-based (navaids)</td>
<td>based on the ground</td>
</tr>
<tr>
<td>sealed (compartment)</td>
<td>made airtight</td>
</tr>
</tbody>
</table>

-FREE
-free at the end of a word = without, absence of:

<table>
<thead>
<tr>
<th>WORD</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>dust-free</td>
<td>with no dirt or dust</td>
</tr>
<tr>
<td>grease-free</td>
<td>with no lubricant</td>
</tr>
<tr>
<td>problem-free</td>
<td>with no problems</td>
</tr>
<tr>
<td>shimmy-free</td>
<td>without nose wheel vibration</td>
</tr>
</tbody>
</table>

-ING
-ing at the end of the verb indicates that the installation or component does this action or is of this type:

<table>
<thead>
<tr>
<th>VERB + -ING</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>overlapping (skin plates)</td>
<td>they are partially superimposed</td>
</tr>
<tr>
<td>quick-setting (instrument)</td>
<td>it is adjusted rapidly</td>
</tr>
<tr>
<td>retaining (plate)</td>
<td>it holds something in position</td>
</tr>
<tr>
<td>rotating (beacon)</td>
<td>it rotates</td>
</tr>
<tr>
<td>sliding (window)</td>
<td>it moves longitudinally on tracks or rails.</td>
</tr>
</tbody>
</table>
-MOUNTED

-mounted shows how or where a part is installed:

<table>
<thead>
<tr>
<th>EXPRESSION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>door-mounted (slide)</td>
<td>installed on a door</td>
</tr>
<tr>
<td>rear-mounted (engines)</td>
<td>engines installed at the tail of the aircraft</td>
</tr>
<tr>
<td>spring-mounted (seat)</td>
<td>installed on springs</td>
</tr>
</tbody>
</table>

NUMBERS

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>ADJECTIVE/PREFIX</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>one</td>
<td>one-way flow</td>
</tr>
<tr>
<td>1</td>
<td>single</td>
<td>single-seat aircraft</td>
</tr>
<tr>
<td>1</td>
<td>uni-</td>
<td>unidirectional beam</td>
</tr>
<tr>
<td>2</td>
<td>two</td>
<td>two-seat unit*</td>
</tr>
<tr>
<td>2</td>
<td>twin</td>
<td>twin-engine aircraft</td>
</tr>
<tr>
<td>2</td>
<td>double</td>
<td>double-skin fuselage</td>
</tr>
<tr>
<td>2</td>
<td>bi-</td>
<td>biplane</td>
</tr>
<tr>
<td>2</td>
<td>dual</td>
<td>dual-antenna radar</td>
</tr>
<tr>
<td>3</td>
<td>three</td>
<td>three-phase current*</td>
</tr>
<tr>
<td>3</td>
<td>tri-</td>
<td>triplexed system</td>
</tr>
<tr>
<td>3</td>
<td>triple</td>
<td>triple-pole switch</td>
</tr>
<tr>
<td>4</td>
<td>four/4</td>
<td>4-blade propeller*</td>
</tr>
<tr>
<td>12</td>
<td>12/twelve</td>
<td>12-tonne thrust*</td>
</tr>
<tr>
<td>X</td>
<td>multiple</td>
<td>multiple-disk brakes*</td>
</tr>
<tr>
<td>X</td>
<td>multi-</td>
<td>multipurpose control and display unit</td>
</tr>
</tbody>
</table>

* NB. Note that qualifying words like seat, phase, blade, tonne and disk are invariable in this case. They do not take an “s”.

POINT-TO-POINT

Connection between two points:

<table>
<thead>
<tr>
<th>EXPRESSION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>back-to-back (seating)</td>
<td>backs touching</td>
</tr>
<tr>
<td>edge-to-edge (joint)</td>
<td>sides in contact, not overlapping</td>
</tr>
<tr>
<td>fuel-to-air (ratio)</td>
<td>proportions of fuel and air</td>
</tr>
<tr>
<td>EXPRESSION</td>
<td>MEANING</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>metal-to-metal (connection)</td>
<td>two metal surfaces in contact</td>
</tr>
<tr>
<td>wing-to-fuselage (mating)</td>
<td>junction between the wing and the fuselage.</td>
</tr>
</tbody>
</table>

-PROOF
-proof = protected from, cannot be damaged by:

<table>
<thead>
<tr>
<th>ADJECTIVE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>fire-proof (compartment)</td>
<td>fire can not damage</td>
</tr>
<tr>
<td>foolproof (connection)</td>
<td>can not be connected incorrectly</td>
</tr>
<tr>
<td>leak-proof (piping)</td>
<td>fluid can not escape</td>
</tr>
<tr>
<td>shockproof (recorder)</td>
<td>can not be damaged by shocks</td>
</tr>
<tr>
<td>waterproof (watch)</td>
<td>water can not enter</td>
</tr>
</tbody>
</table>

-RELATED
Caused by or has a relation with:
Temperature-related (corrosion). Temperature is one of the causes of the corrosion.

-SAFE
Does this without danger to the aircraft:
A failsafe system is a conception of redundancy; part of the system can fail but the function is preserved by the rest of the system.

SELF-
Self- = an automatic or reflexive action:

<table>
<thead>
<tr>
<th>ADJECTIVE</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>self-aligning (bearing)</td>
<td>it centers itself</td>
</tr>
<tr>
<td>self-contained (power source)</td>
<td>autonomous, independent</td>
</tr>
<tr>
<td>self-held (selector)</td>
<td>maintains itself in position automatically (magnetically or under spring pressure)</td>
</tr>
<tr>
<td>self-locking (nut)</td>
<td>locks automatically</td>
</tr>
<tr>
<td>self-lubricating (joint)</td>
<td>has an independent means of lubrication</td>
</tr>
</tbody>
</table>
SHAPE (FORM)
Shape indicated by comparison with a letter, etc.

<table>
<thead>
<tr>
<th>EXPRESSION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-sectioned (extrusion)</td>
<td>a section in the form of an “L”</td>
</tr>
<tr>
<td>T-junction</td>
<td>connection in the form of a “T”</td>
</tr>
<tr>
<td>box-shaped</td>
<td>structure in the form of a box</td>
</tr>
</tbody>
</table>

NOUNS
Nouns are often used to qualify other nouns (see Module A):

<table>
<thead>
<tr>
<th>EXPRESSION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>heavy duty (tires)</td>
<td>made for hard utilization</td>
</tr>
<tr>
<td>quick-disconnect (fastener)</td>
<td>unfastened rapidly</td>
</tr>
<tr>
<td>series (connection)</td>
<td>connected in series</td>
</tr>
<tr>
<td>time-delay (device)</td>
<td>installation which is delayed before operating</td>
</tr>
</tbody>
</table>

-TIGHT
-tight means that the substance mentioned cannot escape, or indicates the degree of torque:

<table>
<thead>
<tr>
<th>EXPRESSION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>airtight (fuselage)</td>
<td>air can not leave</td>
</tr>
<tr>
<td>watertight (casing)</td>
<td>water can not move from a compartment</td>
</tr>
<tr>
<td>hand-tight (nut)</td>
<td>fastened only by hand</td>
</tr>
</tbody>
</table>

-TYPE
-type indicates the variety of the component:
A plug-type door operates like a plug.
VERBS
An action expresses what the component does or how it is installed:

<table>
<thead>
<tr>
<th>EXPRESSION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>push-pull (rod)</td>
<td>moving longitudinally in two directions</td>
</tr>
<tr>
<td>stop (hole)</td>
<td>stops cracks</td>
</tr>
<tr>
<td>tie-down (fitting)</td>
<td>used to attach</td>
</tr>
</tbody>
</table>
Find the expressions which agree with these definitions of types of installation. Look at the examples:

cooled by air

installed on an engine

not affected by impacts

1. incorporated, part of assembly
2. can be adjusted
3. with no dust
4. a light that rotates
5. cannot be damaged by fire
6. autonomous, independent
7. fastener that can be disconnected quickly
8. can be replaced
9. a window that slides
10. locks automatically
11. a seat-unit with 3 seats
12. a generator driven by the engine
13. connection between two metal parts
14. based on the ground
15. with no parasites
16. a plug that cannot be connected incorrectly
17. cabin with two aisles
18. circular seal (ring)
19. partly superimposed
20. holds something in place
21. door between flight deck and cabin
22. installed on a pylon
23. rod moving longitudinally
24. lubricated by its own means
25. ratio between lift and drag
This module contains general information about units of measurement, time, numbers, common abbreviations, etc. which may be useful.

**UNITS OF MEASUREMENT**

<table>
<thead>
<tr>
<th>INCHES</th>
<th>2/3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>7/8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3/4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>5/8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1/2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3/8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1/4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1/8</td>
<td>1</td>
</tr>
</tbody>
</table>

1 FOOT (0.3048 m)

1 YARD (0.914 m)

1 METER

1 KILOMETER

1 STATUTE MILE (1,609 m)

1 NAUTICAL MILE (1,853 m)
### COMMON ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.T.U</td>
<td>British Thermal Unit</td>
</tr>
<tr>
<td>cu.in</td>
<td>cubic inch</td>
</tr>
<tr>
<td>daN</td>
<td>decaNewton</td>
</tr>
<tr>
<td>cwt</td>
<td>hundred weight</td>
</tr>
<tr>
<td>ft</td>
<td>foot</td>
</tr>
<tr>
<td>ft.lb</td>
<td>foot-pound</td>
</tr>
<tr>
<td>fl.oz</td>
<td>fluid ounce</td>
</tr>
<tr>
<td>gal</td>
<td>gallon</td>
</tr>
<tr>
<td>hp</td>
<td>horse power</td>
</tr>
<tr>
<td>in</td>
<td>inch, inches</td>
</tr>
<tr>
<td>kt</td>
<td>knot</td>
</tr>
<tr>
<td>lb</td>
<td>pound</td>
</tr>
<tr>
<td>m</td>
<td>mile, meter</td>
</tr>
<tr>
<td>mph</td>
<td>mile per hour</td>
</tr>
<tr>
<td>mpg</td>
<td>mile per gallon</td>
</tr>
<tr>
<td>nm</td>
<td>nautical mile</td>
</tr>
<tr>
<td>oz</td>
<td>ounce</td>
</tr>
<tr>
<td>psi</td>
<td>pound per square in.</td>
</tr>
<tr>
<td>pt</td>
<td>pint</td>
</tr>
<tr>
<td>rpm</td>
<td>revolutions per minute</td>
</tr>
<tr>
<td>sq. ft</td>
<td>square foot</td>
</tr>
<tr>
<td>yd</td>
<td>yard</td>
</tr>
</tbody>
</table>

### BASIC NUMBERS

<table>
<thead>
<tr>
<th>Number</th>
<th>Word</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>one</td>
</tr>
<tr>
<td>2</td>
<td>two</td>
</tr>
<tr>
<td>3</td>
<td>three</td>
</tr>
<tr>
<td>4</td>
<td>four</td>
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<td>5</td>
<td>five</td>
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<tr>
<td>6</td>
<td>six</td>
</tr>
<tr>
<td>7</td>
<td>seven</td>
</tr>
<tr>
<td>8</td>
<td>eight</td>
</tr>
<tr>
<td>9</td>
<td>nine</td>
</tr>
<tr>
<td>10</td>
<td>ten</td>
</tr>
<tr>
<td>11</td>
<td>eleven</td>
</tr>
<tr>
<td>12</td>
<td>twelve</td>
</tr>
<tr>
<td>13</td>
<td>thirteen</td>
</tr>
<tr>
<td>14</td>
<td>fourteen</td>
</tr>
<tr>
<td>15</td>
<td>fifteen</td>
</tr>
<tr>
<td>16</td>
<td>sixteen</td>
</tr>
<tr>
<td>17</td>
<td>seventeen</td>
</tr>
<tr>
<td>18</td>
<td>eighteen</td>
</tr>
<tr>
<td>19</td>
<td>nineteen</td>
</tr>
<tr>
<td>20</td>
<td>twenty</td>
</tr>
<tr>
<td>21</td>
<td>twenty-one</td>
</tr>
<tr>
<td>22</td>
<td>twenty-two</td>
</tr>
<tr>
<td>23</td>
<td>twenty-three</td>
</tr>
<tr>
<td>24</td>
<td>twenty-four</td>
</tr>
<tr>
<td>25</td>
<td>twenty-five</td>
</tr>
<tr>
<td>30</td>
<td>thirty</td>
</tr>
<tr>
<td>36</td>
<td>thirty-six</td>
</tr>
<tr>
<td>37</td>
<td>thirty-seven</td>
</tr>
<tr>
<td>38</td>
<td>thirty-eight</td>
</tr>
<tr>
<td>39</td>
<td>thirty-nine</td>
</tr>
<tr>
<td>40</td>
<td>forty</td>
</tr>
<tr>
<td>50</td>
<td>fifty</td>
</tr>
<tr>
<td>60</td>
<td>sixty</td>
</tr>
<tr>
<td>70</td>
<td>seventy</td>
</tr>
<tr>
<td>80</td>
<td>eighty</td>
</tr>
<tr>
<td>90</td>
<td>ninety</td>
</tr>
<tr>
<td>100</td>
<td>one hundred, a hundred</td>
</tr>
</tbody>
</table>

### DECIMALS, FRACTIONS ...

<table>
<thead>
<tr>
<th>Decimal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.75</td>
<td>twelve decimal (point) seven five</td>
</tr>
<tr>
<td>1/2</td>
<td>(a) half</td>
</tr>
<tr>
<td>1/3</td>
<td>(a) third</td>
</tr>
<tr>
<td>1/4</td>
<td>(a) quarter, (a) fourth</td>
</tr>
<tr>
<td>2/3</td>
<td>two thirds</td>
</tr>
<tr>
<td>3/4</td>
<td>three quarters, three fourths</td>
</tr>
<tr>
<td>5/6</td>
<td>five sixths</td>
</tr>
</tbody>
</table>

etc...
LARGE NUMBERS

245  two hundred (and) forty-five
890  eight hundred (and) ninety
7,650 seven thousand six hundred (and) fifty
25,800 twenty five thousand eight hundred

ORDINAL NUMBERS

1st    first
2nd    second
3rd    third
4th    fourth
5th    fifth
etc...

QUANTITIES

14,700 lbs. fourteen thousand seven hundred pounds.
48 psi forty-eight psi

REFERENCES

P/N 659-8500/B P N six five nine dash eight five zero zero slash B
RWY 25 Runway two five
AZ 962 Alitalia nine six two
Stand B 06 Stand Bravo zero six

TIME

For professional use, only use the 24-hour clock. Divide time into hours and minutes, e.g.

07.15    seven fifteen
10.40    ten forty
12.00    twelve hundred, noon or twelve noon
14.50    fourteen fifty
15.00    fifteen hundred
19.30    nineteen thirty
23.45    twenty-three forty-five
24.00    twenty-four hundred or midnight

DAYS

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

MONTHS

January February March April May June July August September
October November December
YEAR
The year, like the time, is divided in two:
1992 : nineteen / ninety-two

SYMBOLS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>minute</td>
<td>second</td>
</tr>
<tr>
<td></td>
<td>foot</td>
<td>inch</td>
</tr>
</tbody>
</table>

OPERATIONS

<table>
<thead>
<tr>
<th>+</th>
<th>-</th>
<th>x</th>
<th>÷</th>
<th>=</th>
</tr>
</thead>
<tbody>
<tr>
<td>plus</td>
<td>minus</td>
<td>times</td>
<td>divided by</td>
<td>equals</td>
</tr>
</tbody>
</table>

1:3 one to three
12/20 twelve over twenty, twelve out of twenty
% percent
ft/min feet per minute
> is greater than
< is less than
\geq is greater than or equal to
\sqrt \text{ } square root
\sqrt{4} root 4
x^2 x squared, the square of x
x^3 x cubed, the cube of x

PUNCTUATION

. period, full stop
: colon
[ () brackets, parentheses
, comma
- dash
- hyphen
; semi-colon
/ slash, stroke
... ellipsis
Here are some words which often cause confusion. You have their real meaning and their “false” meaning. They are used here in a technical context.

<table>
<thead>
<tr>
<th>WORD</th>
<th>MEANS</th>
<th>DOES NOT MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>actual</td>
<td>real</td>
<td>present</td>
</tr>
<tr>
<td>also</td>
<td>in addition</td>
<td>as a result, so</td>
</tr>
<tr>
<td>alternating</td>
<td>oscillating</td>
<td>alternative</td>
</tr>
<tr>
<td>alternative</td>
<td>another, secondary</td>
<td>A.C.</td>
</tr>
<tr>
<td>charge</td>
<td>restore battery</td>
<td>load</td>
</tr>
<tr>
<td>circuit</td>
<td>electrical wiring</td>
<td>system</td>
</tr>
<tr>
<td>complete</td>
<td>terminate, finish</td>
<td>replenish</td>
</tr>
<tr>
<td>control</td>
<td>command, order</td>
<td>check</td>
</tr>
<tr>
<td>current</td>
<td>present</td>
<td>common</td>
</tr>
<tr>
<td>delay</td>
<td>being late</td>
<td>delivery time</td>
</tr>
<tr>
<td>demand</td>
<td>need, insist</td>
<td>ask for</td>
</tr>
<tr>
<td>depress</td>
<td>press, push</td>
<td>depressurize</td>
</tr>
<tr>
<td>fulfil(l)</td>
<td>satisfy, respect</td>
<td>fill</td>
</tr>
<tr>
<td>good</td>
<td>high quality</td>
<td>correct</td>
</tr>
<tr>
<td>important</td>
<td>significant, valuable</td>
<td>big</td>
</tr>
<tr>
<td>insulate</td>
<td>protect thermally,</td>
<td>isolate</td>
</tr>
<tr>
<td></td>
<td>electrically, phonically</td>
<td></td>
</tr>
<tr>
<td>introduce</td>
<td>present, put into practice</td>
<td>insert</td>
</tr>
<tr>
<td>isolate</td>
<td>cut off, separate</td>
<td>insulate</td>
</tr>
<tr>
<td>large</td>
<td>big</td>
<td>wide</td>
</tr>
<tr>
<td>let</td>
<td>allow, permit</td>
<td>leave</td>
</tr>
<tr>
<td>planning</td>
<td>activity of making a plan</td>
<td>schedule</td>
</tr>
<tr>
<td>prevent</td>
<td>stop from doing, inhibit</td>
<td>warn</td>
</tr>
<tr>
<td>previous</td>
<td>preceding</td>
<td>planned</td>
</tr>
<tr>
<td>pylon</td>
<td>engine attachment</td>
<td>pedestal</td>
</tr>
<tr>
<td>replenish</td>
<td>top up level</td>
<td>fill</td>
</tr>
<tr>
<td>WORD</td>
<td>MEANS</td>
<td>DOES NOT MEAN</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>require</td>
<td>need</td>
<td>ask for</td>
</tr>
<tr>
<td>retard</td>
<td>pull back throttle levers</td>
<td>delay</td>
</tr>
<tr>
<td>security</td>
<td>protection from intentional human action (terrorism, theft, spying, etc.)</td>
<td>safety</td>
</tr>
<tr>
<td>then</td>
<td>after that</td>
<td>consequently</td>
</tr>
</tbody>
</table>
# Exercises

Find the synonym or expression on the right which agrees with (matches) the word on the left. You can check your answers in the Exercise Key.

| 1. CONTROL                  | A. REQUIRES ATTENTION           |
| 2. PREVIOUS                 | B. TERMINATED                   |
| 3. ISOLATE                  | C. RESPECT, SATISFY             |
| 4. CIRCUIT                  | D. LATE, BEHIND SCHEDULE        |
| 5. ACTUAL                   | E. PROTECT                      |
| 6. REQUIRE                  | F. EFFECTIVE, REAL              |
| 7. ALTERNATING              | G. ANTICIPATE, STOP             |
| 8. LARGE                    | H. EXCELLENT                    |
| 9. RETARD                   | I. PUSH                         |
| 10. PYLON                   | J. TOO, IN ADDITION             |
| 11. CHARGE                  | K. AT THE MOMENT                |
| 12. COMPLETE                | L. GIVE PERMISSION              |
| 13. INSULATE                | M. ADD FLUID                    |
| 14. DEPRESS                 | N. THE ONE BEFORE               |
| 15. GOOD                    | O. ANOTHER                      |
| 16. LET                     | P. DONE TO A BATTERY            |
| 17. DELAY                   | Q. BETWEEN ENGINE + WING        |
| 18. ALSO                    | R. COMMAND                      |
| 19. FULFIL(L)               | S. ELECTRICAL ASSEMBLY          |
| 20. THEN                    | T. A.C.                         |
| 21. IMPORTANT               | U. NEXT                         |
| 22. PREVENT                 | V. NEED                         |
| 23. ALTERNATIVE             | W. REDUCE THRUST                |
| 24. CURRENT                 | X. BIG                          |
| 25. REPLENISH               | Y. SEPARATE                     |
Use the words in this module to complete these sentences. Do not forget the correct form!

1. Insert a safety pin to ......................... the gear from retracting.
2. “AFTER TAKE-OFF checklist..........................”
3. There is a short ........................................ on the board.
4. There is a 20-minute ...................
5. All the conditions are ..................<br>6. The ............................................ burn-off (trip fuel) was 600 kg more than planned.
7. The motor ........................................ servicing every 750 cycles.
8. ........................................ the oil cool before checking the level.
9. The cabin is ........................................ with glass wool blankets.
10. A synthetic voice says “..........................” on landing.
12. ........................................ the shock absorber/battery.
13. The engines are mounted on ..................
14. There is a ........................................ amount of fuel under the engine.
15. The crew experienced this problem on the ......................... flight.
16. ........................................ the oil level in the gearbox.
17. ........................................ the push-button and observe the lights come on.
18. In case of a leak, that part of the system is ..................
19. Only use ......................................... quality products.
20. The ........................................ standard is revision 6.
21. The valve regulates the flow and ......................... shuts off the supply.
22. The computer ................................. the engine speed.
23. Set the master lever to OFF. .......................... press the APU fire push-button.
24. It is ........................................ to respect the procedure.
25. There is an ........................................., back-up supply.
INTRODUCTION

"Simplified English" originated in the early 1980s with the European airlines' (AEA) and European airline manufacturers' (ACEMA) determination to establish a standardized and basic form of the English language for use in maintenance documentation. Between 1981 and 1986 working groups analyzed the verbs used in Maintenance Manuals, established a list of recommended verbs, defined the writing rules of Simplified English and produced a Simplified English Dictionary including a word list of approved terms and a Guide for the preparation of aircraft maintenance documentation in the international aerospace maintenance language.

These rules, and the principles that guide them, began to be applied in the second half of the 1980s to the maintenance documentation of the latest generation of aircraft and some of their equipment. It is a long and gradual process: Simplified English is not frozen and its application, even today, is only partial. Obviously, it is absent from all documents produced before 1985.
OBJECTIVES

The purpose of Simplified English is to make life easier for the writers (technical editors) and users (technicians, mechanics) of maintenance documents.

Simplified English is designed to:
1. standardize and reduce the number of words used, i.e. avoid using more than one word with the same meaning and defining one meaning for each word used;
2. standardize and simplify the syntax and grammar used, in order to make maintenance texts clearer and simpler.

N.B. For the moment at least, Simplified English only applies to certain essential maintenance documents like the Aircraft Maintenance Manual, Overhaul Manuals, Component Maintenance Manuals etc. It is not used in engineering, flight, day-to-day or operations documents or in regulations. However, there is a tendency to respect the principle of a simpler language even in these texts.

The language and terminology explained in this book, and the examples given, are not necessarily in Simplified English. The purpose of this book is, of course, to help use existing documentation (most of which is not in Simplified English) and not define how it should be written!

PRINCIPLES OF SIMPLIFIED ENGLISH: WORDS

The standardization of technical words as they appear in the Simplified English Dictionary only applies to general technical words. Specific manufacturers’ terminology or technical names (e.g. Droop Signal Unit, Rotor Active Clearance Control) and manufacturing processes and malfunctions (e.g. milling, reaming, pitting, tapering, etc.) are not affected.

ONE MEANING, ONE WORD

When there are different words with the same meaning, Simplified English decides which word will be used, e.g., from the words in this list:

notify advise inform tell

You must use tell.

ONE WORD, ONE MEANING

When a word has different meanings, usually only one of these meanings is selected and alternative words are attributed to the other senses of the word:

extinguish = to stop a fire, to cause to stop burning

“Extinguish” for a light (indicator lights illuminated/extinguished) is expressed by go off.
ONE WORD, ONE FUNCTION

In general, only one part of speech or function is permitted for each word, e.g. heat (noun) = energy as a result of movement of molecules.
The verb to heat is replaced by to increase the temperature.

leak (noun) = a crack or hole which accidentally lets fluid or light go into or come out of something.
The verb to leak is replaced by a construction with is a leak, are leaks...

So, there is a tendency to reduce the number of verbs permitted and to avoid the use of irregular verbs whenever possible, e.g.
Split is replaced by divide.
Lay is replaced by put down.

As a result of the reduction in the number of verbs permitted there are many expressions of the type make/become + adjective or noun, e.g.

<table>
<thead>
<tr>
<th>VERB</th>
<th>SIMPLIFIED ENGLISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>to straighten</td>
<td>to make/become straight</td>
</tr>
<tr>
<td>to analyze</td>
<td>to make an analysis</td>
</tr>
<tr>
<td>to check</td>
<td>to make sure, to do a check</td>
</tr>
<tr>
<td>to bank</td>
<td>to make a bank</td>
</tr>
<tr>
<td>to splice</td>
<td>to make a splice</td>
</tr>
</tbody>
</table>

As an indication, here is an alphabetical list of the verbs used in Simplified English:

accept
adapt
add
adjust
agree
align
apply
arm
assemble
attach
balance
be
become
bend
bleed
blow
bond
break
breathe
burn
calibrate
can
cancel
catch
cause
change
charge
clean
close
collect
come
compare
complete
compress
connect
contain
continue
correct
count
cut
decrease
deflate
defuel
disarm
disassemble
discard
disconnect
disengage
divide
do
drain
drink
energize
erase
examine
extend
extinguish
fall
feather
feel
fill
fire
flash
4 WRITING RULES: SYNTAX AND GRAMMAR

Simplified English uses these rules to clarify and simplify technical texts:

COMPOUND EXPRESSIONS (“NOUN CLUSTERS”)
No group of words, or “nouns clusters”, has more than 3 nouns together. So, for example:
CARGO DOOR LOCKSHAFT PROXIMITY DETECTOR becomes
THE PROXIMITY DETECTOR ON THE LOCKSHAFT OF THE CARGO DOOR

But, when the “noun cluster” is an official technical term, you can use hyphens (“-“) to clarify the relation between the words. Thus, this is possible:
THE CARGO-DOOR LOCKSHAFT PROXIMITY-DETECTOR

ELIMINATE ABSTRACT NOTIONS IN FAVOR OF DESCRIPTIONS
Avoid constructions introduced by abstract verbs such as provide, enable, achieve, ensure, accomplish and obtain. So:
... THAT PROVIDES RUDDER PEDAL ADJUSTMENT becomes
... THAT ADJUSTS THE RUDDER PEDALS
NOT TOO MUCH INFORMATION IN EACH SENTENCE
The following sentence:
Pressure oil from the pump is delivered to a spring-loaded relief valve, which has a double function as it controls the pressure of oil available for the lubrication of the cabin blower, the pneumatic compressor and the extension drive shaft support and acts as a pressure reducing valve in the internal lubrication system.

becomes:
Pressurized oil from the pump is supplied to a spring-loaded relief valve. The valve has two functions. It controls the pressure of oil available to lubricate the cabin blower, the pneumatic compressor and the support of the extension drive shaft. It is also a pressure-reducing valve in the internal oil system.

VERBS: TENSES PERMITTED
Only some forms or verb tenses are permitted:

<table>
<thead>
<tr>
<th>INFINITIVE/IMPERATIVE</th>
<th>PRESENT SIMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>connect</td>
<td>connects/connect</td>
</tr>
<tr>
<td>see</td>
<td>sees/see</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRETERITE</th>
<th>PAST PARTICIPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>connected</td>
<td>connected</td>
</tr>
<tr>
<td>saw</td>
<td>seen</td>
</tr>
</tbody>
</table>

These forms can be used with will, can, must, is, are, etc., e.g.
It will disconnect at 45 psi.
You must disarm...
You can set...

PAST PARTICIPLE
The primary use of the past participle is to indicate a state, a condition etc. (see Module S) with is/are:
If the part is damaged...
When the slats are extended...
The thrust reversers are deployed.

PASSIVE/ACTIVE (see Module P)
Use only the active voice in procedures. In Description and Operation sections, use the active as much as possible. One sentence in ten can be passive. Wherever possible, a passive form becomes active:
The gearbox is moved by the engine.
**becomes:** The engine *moves* the gearbox.

Low oil pressure is shown by a warning light.
**becomes:** A warning light *shows* low oil-pressure.

**In procedures, use you, we or the imperative:**
The tanks are drained.
**becomes:** *You drain* the tanks. or: *Drain* the tanks.

**SENTENCES**
**Maximum length:** 20 words. No more than 3 “clauses” (parts of a sentence with a verb) in each sentence. Look at the following sentence:
A drop-cord, which retains the lamp assembly when you change the bulb, connects the housing to the frame.
**In the sentence there are 3 clauses:**
- main clause: “A drop-cord connects the housing to the frame”;
- subordinate clause: “which retains the lamp assembly”;
- time clause: “when you change the bulb”.

**USE OF TABULAR LAYOUT TO MAKE INFORMATION CLEAR**

**A VARIETY OF SENTENCE LENGTH: A SUCCESSION OF LONG AND SHORT SENTENCES.**

**PARAGRAPHS**
**Maximum length:** 6 sentences.
Avoid one-sentence paragraphs.
Change of paragraph = change of subject.
Variation in paragraph length.

**WARNINGS, CAUTIONS**
**Warnings and Cautions must be imperatives not theoretical explanations of danger or risk:**
Prolonged contact of oil on the skin could result in intoxication through absorption, as this type of engine oil contains additives.
**becomes:** Do not let oil stay on your skin for a long time as it can cause injury.

**PUNCTUATION**
**Stricter use of punctuation to articulate and clarify documents.**
A colon (:) indicates information is to follow, e.g.

**WARNING:** make sure that you have....
The wing structure includes: two main spars, 26 ribs, machined webs...
A dash (--) is used to clarify tabulations, lists, etc.
The following circuits are affected:
- APU fuel pump circuit,
- APU emergency shut-down circuit,
- APU fire extinguishing circuit.

A hyphen (-) joins words which are directly associated in a word cluster:
wing center-box, threaded-type connection, shut-off valve;
seventy-four, four-to-one, 3-seat unit, back-to-back;
de-energize, de-icing, post-flight, anti-skid.

Parentheses or brackets are used to refer to references or figures:
(see figure 1.12)

They are also used to isolate information in the middle of a sentence, and to
give step or item numbers in a procedure.
The semi-colon (;) makes a more definite mark than a comma (,) and often
indicates groups of items.

5 CONCLUSION

This short and simplified overview of Simplified English is not exhaustive. It is
only made to give a fast introduction to its principles and application.
Simplified English is still at an early stage in its development and implementa-
tion. Some of the individual decisions may look unsatisfactory. But it will
help to make much aircraft documentation more rational and easier to use
all round the world.

6 SOME RANDOM EXAMPLES OF SIMPLIFIED ENGLISH

These examples are only to give you a “feel” for the style of Simplified
English and show the difference with conventional editing:

Put a warning notice on the HP ground connector to tell the persons not to pres-
surize the pneumatic system.

Make sure that all the circuits are isolated before you supply electrical power to
the aircraft.

The structure is an extension to the fuselage and gives easy access to the air
conditioning and hydraulic equipment.

Disconnect the return line of the hydraulic power from the case drain hose.

Move the spring (15) and remove the pin (14).
You must remove the sense-line between the air-cycle machine and the anti ice valve before you start these procedures.

The APU LP fuel shut-off valve has a ball valve assembly and an actuator assembly. You can remove the actuator, with the valve in position, without the necessity to drain the system.

The N1 predictive value shows the N1 value that will be reached by the engine LP rotor for the given position of the thrust lever.

You can get access to the holes forward of the main landing gear bay. Light-alloy panels close the holes.
This module contains about fifty words used in maintenance documents and not included in the other modules. They are divided into ELECTRICAL terms, ELECTRONIC terms and MECHANICAL terms.

\( v \) = verb
\( n \) = noun, substantive
\( adj \) = adjective, qualifier

**ELECTRICAL TERMS**

APPLY \( (v) \) (send, supply, connect a voltage to a particular point)  
Apply 5v to pin 519.

CRIMPED (be pressed or pinched together for joining)

DOUBLE THROW \( (adj) \) (switch that can be moved in two directions)

DROP \( (v, n) \) (decrease, go down, decrement \( \neq \) increase)
If the voltage drops, it is detected by the voltmeter. \( (v) \)
Any drop in voltage is detected by the voltmeter. \( (n) \)

EFFICIENCY \( (n) \) (ratio to measure productivity; ratio of energy input to energy output)
70% efficiency

GATE \( (n) \) (a device that outputs a signal when certain inputs are received)

INSULATE \( (v) \) (protect conductivity of electrical wiring with plastic, rubber, glass etc.)
KINK \((v, n)\) (small bend, twist, non-linearity in wire)

LAG \((v, n)\) (be late, be behind in time; the delay between two signals, current etc.)

LOAD \((v, n)\) (make something support a demand)
When the generator load is too high, the galley is shed.

PEAK \((v, n)\) (reaches a high point or maximum value)
The current oscillates between 14.2 and 16.4 amps; it peaks at 16.4 amps. \((v)\)
The current peak is 16.4 amps. \((n)\)

RANGE \((v, n)\) (the extent of a variation or movement; the arc on an instrument which indicates this variation)

RATING \((n)\), RATE \((v)\) (the value attributed to an instrument, device, motor etc. \([n]\); to attribute a value \([v]\))
The output is rated at 250 KVA.

SHIELDED (protected from mechanical damage or the effect of magnetic fields etc.)
Wiring is shielded in critical areas.

SOLDERED (wires, components, integrated circuits, etc., connected by the application of heat and soft metal [solder] using a soldering iron)

STAGE \((n)\) (level, degree, step, section, element in a circuit)

STEP-DOWN \((adj)\) (reduction from one level to another)
A step-down transformer converts 115 VAC to 28 VAC.

STRIP \((v)\) (1. remove the insulation from a conductor in order to connect it; 2. remove the accessories from a piece of equipment)

SWAGE \((v)\) (connected by folding a metal edge to hold wiring in place)

TOGGLE-TYPE \((adj)\) (description of a switch moving between two poles)
TRIP (v) (open, pull, trigger a circuit breaker manually or automatically, ≠ set)

TWIST (v) (coil, wind, turn around in a spiral – intentionally or unintentionally)

WAVE (n) (undulation, undulating movement)

WOUND (from the verb to wind; see twisted)

WIRE BUNDLE, WIRE LOOM (n) (group or assembly of wires connected together)

2 ELECTRONIC TERMS

BATCH (n) (group, set)

BUG (n) (defect in program, etc.; see debugging: final removal of defects)

DOWNTIME (n) (time the system is not operational due to failure or maintenance)

E.D.P/ELECTRONIC DATA PROCESSING (n) (computerized handling of information)

FIELD (n) (area, part of screen, etc. to be filled with data)

FILE (n) (section of memory containing specific data)

LOG ON, LOG OFF (v) (record the beginning and end of use of a system)

NETWORK (n) (system of all the computers, terminals, links, interfaces, users, etc.)

SAFEGUARD (v) (protect the data entered from unintentional destruction by human error or a power failure)

STORE (v) (memorize, keep in a file, etc.)

3 MECHANICAL TERMS

COAT (v, n) (cover with a layer of paint, varnish or protection; a layer of protection)
DISCARD (v) (throw away, scrap, reject, destroy)
All non-rotatable or consumable parts are discarded after use; they are not repaired or overhauled.

GRIP (v, n) (hold tightly, seize; part of handle held in the hands)

LAY (v) (install material or wiring horizontally)

MACHINE (v) (work or shape a part with a machine tool [lathe, milling machine, etc.])

MESH (v, n) (interaction of two gear wheels)

MILL (v) (remove material using a rotating head)

OVERHAUL (v, n) (complete maintenance action; IL and D- check on aircraft; repair and check equipment for a new potential of operating hours)

OVERLAP (v, n) (partial superposition of two surfaces, e.g. lapjoint on fuselage skin panels)

PLOT (v) (mark points on a graph, curve, plan or chart)

RETAIN (v) (maintain in position, keep)

SCRAP (v) (see Discard)

SERVICING (n) (light maintenance and checks while aircraft is in operation)
Servicing is performed during the turnaround.

SPIN (v) (to rotate quickly about an axis, e.g. Gyro)

THREAD (n, v) (groove, spiral mark on screw, bolt, nut, etc.)

TWIST (v) (turn wire or material about itself, rotate, torque)

WIPER (v) (use a piece of fabric [cloth, rag] to remove surface dirt, etc.)
Complete this crossword using the words explained in the notes of this Module.

ACROSS
1. = memorize
2. protect data
3. maximum value
4. group
5. protect
6. a C/B pops or is pulled
7. install horizontally
8. when machine is unserviceable
9. mark values on a curve
10. organization of wires, connections, components

DOWN
1. = scrap
2. measurement of output
3. record beginning of use
4. groove on screw, etc.
5. handling information
6. mechanical means of connecting wires, etc.
7. delay between two signals, etc.
8. value estimated
9. part of a circuit, etc.
10. layer
11. remove dirt with cloth, etc.
12. small bend in wire
Find the words and expressions which refer to these common IATA telex abbreviations.

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<td>7. ABD, O/B</td>
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<td>8. AS PER</td>
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<td>9. DEL</td>
<td>19. QRP</td>
<td>29. RCMD</td>
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<td>10. KT</td>
<td>20. LT</td>
<td>30. RUSHR</td>
<td>40. FRAV</td>
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1. according to
2. time a/c should arrive
3. response
4. recommend
5. inform
6. on board
7. flight
8. regret, apologize
9. confirm
10. urgent a/c parts
11. 4th month
12. not GMT
13. will inform
14. manufacturer's S/N
15. defines No-Go
16. thank you
17. time a/c left
18. handling
19. with reference to your telex
20. before signature
21. ask for
22. with reference to
23. remove from a/c
24. prior to
25. first available
26. turn back to ramp
27. the one before
28. notify
29. verify
30. unit of speed
31. very quickly
32. airplane
33. will get in touch
34. schedule
35. confirm receipt
36. cargo in hold 5
37. airline
38. not known
39. to be late
40. answer quickly
Read these extracts of reports from the log book (tech. log) and do the exercises.

**EXTRACT ONE**

After take-off, L.H. engine TEMP HI and REGUL FAULT lights came on and LH bleed valve closed automatically. QRF. Following actions performed:

- Replaced both HP bleed valves S/N P555 and HP bleed pressure sensor signal hose 47 HA.
- The fault recurred during the subsequent test run-up.
- No discrepancy was found during visual inspect of:
  - ducts downstream of the fan air valve.
  - the precooler and fan air valve plate
  - the fan air valve.
- Normal operation of the bleed air system resumed after replacement of HP bleed valve and pneumatic controller.

**A. Answer the questions.**

1. Which valve closed automatically?

2. Did the a/c turn back on the ground?

3. Is part 47 HA an electrical part?

4. Does “subsequent” mean: i) necessary, ii) following, or iii) resulting?

5. Which part of the aircraft is used for a “test run-up”?

6. Which word means “difference, anomaly, fault”?

7. Which word means “farther down the line”?

8. What is the fan air valve mounted on?

9. Does “resume” mean: i) start again, ii) investigated or iii) summarized?
EXTRACT TWO

Take-off was aborted at 70 Kt. as IAS flag in Capt. ASI came into view. As an interim measure the indicator was switched to ADC 2 and the a/c returned to service. At base, ADC N° 1 was replaced and IAS indicators were swapped.

B. Answer the questions.

1. Is this a QRF?

2. Was the ASI measured?

3. Does “switched to” mean: i) energized, ii) activated or iii) transferred?

4. At the base were the indicators: i) crossed over, ii) scrapped or iii) recalibrated?

EXTRACT THREE

C. Put these words in the correct place in this extract.

BLEEDS    UNTIMELY    MANUAL
ALL       DELAYED     RUN
RAMP     PRIOR TO   DROPPED

At LPA, just 1 T/O 2, ground auxiliary valve and 3 4 pressure regulating valves had 4 closure. Cabin altitude 5 to minus 2,200 feet with PNEU warning on MWP. Closed all air 6 and depressurized cabin by opening 7 depressurization valve. Return to 8, A/C 9 for 0h35 min.

EXTRACT FOUR

During cruise at FL 310, N° 2 RH window outer ply cracked under normal heating conditions. Procedure applied. Flight pursued at FL 200. A technical investigation is requested. Panel replaced at MAD by IB Engineering.

D. Answer the questions.
1. Did the First Officer windshield crack?

2. What other parts have a “ply”: i) galleys, ii) tires or iii) APU?

3. What did they apply?

4. Who changed the panel?

EXTRACT FIVE

E. Put these words in the correct place in this extract.

REPLACED STUCK DEACTIVATED DUE TO AS GATE

Plane returned to .............. 1 from taxiway .............. 2 nacelle anti-ice valve of engine N° 2 .............. 3 in closed position. .............. 4 an interim action, the valve was .............. 5 in open position. Final repair at FRA where anti-ice valve was .............. 6.

EXTRACT SIX

F. Put these words in the right place in this extract.

CAME ON REPLACED REVEALED SOUNDED CAUTIONARY DIVERTED REPETITIVE REMAINED BOTH LEAVING

30 minutes after .............. 1 CDG, SMOKE MWP and .............. 2 chime .............. 3. MID COMPT SMOKE caption light .............. 4 .............. 5 bottles were discharged but warning light .............. 6 on. A/C was .............. 7 to BOD. Inspection .............. 8 no abnormalities. As a .............. 9 measure, the following parts were .............. 10.
EXTRACT SEVEN


G. Answer the questions.

1. What a/c system is involved (concerned)?

2. What was abnormal?

3. How much did cabin rate of climb decrease?

4. Did Delta P decrease too?

5. Did crew use RATE Knob?

6. How did they solve the problem?

7. Was this the first case of this incident?
REVIEW FOUR

1. Complete these sentences with words from Modules N-W. You have some help in parentheses.

1. 5,000 feet is ....................... than 1,000 meters. (LENGTH)

2. The B 747 is the ....................... civilian transport. (WEIGHT)

3. The ailerons are ....................... up and down.

4. A.T.A. or ....................... Time of Arrival. (REAL)

5. A ....................... cans of oil are required. (A SMALL NUMBER)

6. ....................... pilot has a reading light.

7. The portable oxygen cylinder is ....................... in a locker.

8. The operating range is 150° .......................... 230° C.

9. There is 3 mm. ....................... between the two parts. (FREE DISTANCE)

10. System 1 ....................... System 2 can be used. (ALTERNATIVE)

11. The cabin is ....................... with fiberglass blankets. (PROTECTED)

12. There is a ....................... oil under the engine. (A SMALL QUANTITY)

13. The cabin attendants can be called from ....................... Passenger Service Unit.

14. A VHF antenna is ....................... on the upper fuselage. (INSTALLED)

15. The manufacturer ....................... a revision after each modification.

16. The engine should ....................... 98% N1 in 50 seconds.

17. The incident occurred ....................... climb.

18. Doors must be closed and ....................... . (SECURED)


20. Two busbars are ....................... together. (CONNECTED)

21. Wing anti-icing ....................... ice formation on the wing.
22. The bolt is loosened by being rotated ......................... (→)

23. Turning the Park Brake handle ...................... the brakes.

24. The lever moves the bell crank which in ...................... moves the cable.

25. When the secondary flight controls are retracted, the airplane is ......................

26. The warning lights are steady or ....................... (INTERMITTENT)

27. If the oil level is low, it is ...................... by the engineer.

28. The landing gear ...................... of four main gears and a nose gear. (COMPOSITION)

29. ...................... engines are protected by fire detection loops.

30. The weather is ...................... on the screen.

31. If there is an overvoltage the circuit breaker is ......................

32. Press the push-button to ...................... the system to zero.

33. Engine removal ...................... 8 hours. (DURATION)

34. The audio warning can be ...................... (STOPPED)

35. When the doors are closed, they should be ...................... with the fuselage skin (AT THE SAME LEVEL)

These questions refer to Modules A to Y. Try and find the word which agrees with the explanation, definition or question. Test your knowledge. Do not refer to the modules for the answer. The number of letters is given, and the first example has been done for you. Check your answers in the Exercise Key.

1. A decrease, a decrement.  D R O P

2. Contrary of “thick”.  _ _ _ _ _

3. The pylon is ...................... the wing and the engine.  _ _ _ _ _ _

4. To put out a light or fire.  _ _ _ _ _ _ _ _

5. Indicates action performed.  _ _
6. Prefix meaning “exceeding”.

7. Adjust flight control cables.

8. Distance between two parts.

9. Used for electrical wiring. C PP

10. To “feed” or ........................................

11. Like the movement of a clock.

12. Mixture of metals.

13. Gear and surfaces retracted, or free of dirt.


15. Contrary of “upper”.

16. When door etc and fuselage are aligned.

17. Rectilinear.

18. Entry of air, water, fuel, etc.

19. Compare two indications.

20. Return of data, position, etc.

21. The rear of the wing. EDGE

22. A machine that prints.

23. Detection or ........................................ S

24. The cables run ...................... the cut-out. H

25. ...................... the selector to “A + B”.

26. Past participle of “drive”.

27. When the part is ...................... (wear) it is replaced.

28. The damage is located ...................... 4 o’clock.

29. The Bleed Valve enables one engine to supply ...................... wings.
30. The A.P.U. cool before checking the oil.

31. The probes (be) electrically (heat).

32. Suppress, stop, annul, clear.

33. The forward cabin is row 1 row 12.

34. Wind perpendicular to a/c.

35. Reception is bad or P

36. The of the THS is to trim the a/c. P

37. Fasten (door, fitting, etc.)

38. Electrical, thermal, phonic protection. N

39. The flight was delayed a failure.

40. Lower point in a flow, system, etc.

41. The engine provide 22,000 lbs of thrust.

42. Not locked.

43. This is fragile. with care.

44. A check valve is the same a non-return valve.

45. Return to initial position.

46. When a control, etc. is difficult to move. S

47. Ice form on the wings.

48. Introduces a result or consequence.

49. The (great) the weight, the (great) the thrust.

50. To remove electrical power.

51. The control is electrical the power is hydraulic. W S

52. Contrary of “wide”.
53. covers are used to stop an open pipe. B

54. Difference between heading and course. D

55. Same as "furthermore". M

56. "Above" or 

57. The flight controls about an axis.

58. Contrary of "advance". The pilot must do it on touchdown.

59. The job 2 hours.

60. The contrary of "much" and "more" are "little" and

61. Regular, continuous movement. S

62. Incorrect operation. L

63. It equals 2.54 cm.

64. The a/c's "ceiling" is the altitude it can fly at.

65. To make longer.

66. The wing and wing center box are joined . T

67. Press, hold and (push-button) 

68. To screw, torque or T

69. 1 nautical mile per hour.

70. Cockpit windows are fixed or S

71. Immediately, the moment something happens.

72. speed from 250 to 320 knots.

73. Impact by foreign object, e.g. bird, stone, lightning. K

74. the blue or the green system.

75. The handle is S

76. To be too hot.
77. The crew of three members. 

78. Contrary of “subtract”. 

79. Phase. 

80. A few gallons, a fuel. 

81. Without dust. 

82. The Artificial Horizon the attitude. 

83. Intermittent light. 

84. It locks automatically. 

85. Several but not all. 

86. Cannot be damaged by fire. 

87. Contrary of “bottom”. 

88. The safety the part from moving. 

89. pilot has an instrument panel. 

90. Replace the seal it is worn. 

91. Real, effective. 

92. = “must”. 

93. Can be replaced in line. 

94. The seal is worn replace it. 

95. “/” is a “stroke” or . 

96. Cooled by air. 

97. System that takes hot air from compressor. 

98. The gear leg is on the wing box. 

99. Preceding, the one before. 

100. This is the question.
IDENTIFYING THE MAIN ELEMENTS

In the future, when you read a text, do not always read it linearly. We recommend you try and identify the main parts of each sentence. This will train you to find the “key” to the text more quickly. It will also give you a better “feel” for the structure of the sentence. You will be able to distinguish between what is important and what is secondary. This will save time and make your use of English more productive and interesting.

As an example, here is a short text repeated six times. Each time just one element is highlighted (in bold type):
Text 1. The subjects
Text 2. The verbs
Text 3. The compound expressions (or “word clusters”)
Text 4. Prepositions and location words
Text 5. The main clauses

If you put this technique into practice on your own texts, you will find you soon have a better visual and intellectual command of the texts.

TEXT 1: SUBJECT OF THE SENTENCE

The two outflow valves are flange-mounted to the front side of the rear pressure bulkhead just above floor level in a sound-proofed box with a quick-removable cover. Each valve consists of two major sections: an outflow poppet section and a control chamber section. The main diaphragm separates the two sections and forms a flexible air-tight partition between them. The outflow poppet section consists of a spider-type base, to the center of which a pedestal and a baffle-type support are mounted.

The spring-loaded outflow poppet, consisting of two parts, is mounted on the main diaphragm and is guided in its center by a pin, which slides in a bush in the pedestal.
A vacuum relief diaphragm is clamped at its periphery between the two parts of the outflow poppet and is attached at its center to the pedestal. Normally it rests on the baffle-type support and forms together with the outflow poppet head a separate chamber, which is connected to cabin pressure via holes in the poppet valve.

**TEXT 2: VERBS**

The two outflow valves are flange-mounted to the front side of the rear pressure bulkhead just above floor level in a sound-proofed box with a quick-removable cover.

Each valve consists of two major sections: an outflow poppet section and a control chamber section. The main diaphragm separates the two sections and forms a flexible air-tight partition between them. The outflow poppet section consists of a spider-type base, to the center of which a pedestal and a baffle-type support are mounted.

The spring-loaded outflow poppet, consisting of two parts, is mounted on the main diaphragm and is guided in its center by a pin, which slides in a bush in the pedestal. A vacuum relief diaphragm is clamped at its periphery between the two parts of the outflow poppet and is attached at its center to the pedestal. Normally it rests on the baffle-type support and forms together with the outflow poppet head a separate chamber, which is connected to cabin pressure via holes in the poppet valve.

**TEXT 3: COMPOUND EXPRESSIONS**

The two outflow valves are flange-mounted to the front side of the rear pressure bulkhead just above floor level in a sound-proofed box with a quick-removable cover.

Each valve consists of two major sections: an outflow poppet section and a control chamber section. The main diaphragm separates the two sections and forms a flexible air-tight partition between them. The outflow poppet section consists of a spider-type base, to the center of which a pedestal and a baffle-type support are mounted.

The spring-loaded outflow poppet, consisting of two parts, is mounted on the main diaphragm and is guided in its center by a pin, which slides in a bush in the pedestal. A vacuum relief diaphragm is clamped at its periphery between the two parts of the outflow poppet and is attached at its center to the pedestal. Normally it rests on the baffle-type support and forms together with the outflow poppet head a separate chamber, which is connected to cabin pressure via holes in the poppet valve.

**TEXT 4: PREPOSITIONS AND LOCATION WORDS**

The two outflow valves are flange-mounted to the front side of the rear pressure bulkhead just above floor level in a sound-proofed box with a quick-removable cover.

Each valve consists of two major sections: an outflow poppet section and a control chamber section. The main diaphragm separates the two sections and
forms a flexible air-tight partition between them. The outflow poppet section consists of a spider-type base, to the center of which a pedestal and a baffle-type support are mounted.

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**TEXT 5: MAIN CLAUSES**

The two outflow valves are flange-mounted to the front side of the rear pressure bulkhead just above floor level in a sound-proofed box with a quick-removable cover.

Each valve consists of two major sections: an outflow poppet section and a control chamber section. The main diaphragm separates the two sections and forms a flexible air-tight partition between them. The outflow poppet section consists of a spider-type base, to the center of which a pedestal and a baffle-type support are mounted.

The spring-loaded outflow poppet, consisting of two parts, is mounted on the main diaphragm and is guided in its center by a pin, which slides in a bush in the pedestal. A vacuum relief diaphragm is clamped at its periphery between the two parts of the outflow poppet and is attached at its center to the pedestal. Normally it rests on the baffle-type support and forms together with the outflow poppet head a separate chamber, which is connected to cabin pressure via holes in the poppet valve.

**TEXT 6: LIST OF COMPONENTS**

The two outflow valves are flange-mounted to the front side of the rear pressure bulkhead just above floor level in a sound-proofed box with a quick-removable cover.

Each valve consists of two major sections: an outflow poppet section and a control chamber section. The main diaphragm separates the two sections and forms a flexible air-tight partition between them. The outflow poppet section consists of a spider-type base, to the center of which a pedestal and a baffle-type support are mounted.

The spring-loaded outflow poppet, consisting of two parts, is mounted on the main diaphragm and is guided in its center by a pin, which slides in a bush in the pedestal. A vacuum relief diaphragm is clamped at its periphery between the two parts of the outflow poppet and is attached at its center to the pedestal. Normally it rests on the baffle-type support and forms together with the outflow poppet head a separate chamber, which is connected to cabin pressure via holes in the poppet valve.
VOCABULARY LEARNING

Here are some suggestions on how to memorize new words more effectively. If you have a more active attitude you will find it easier and pleasanter.

Translation is not always the best way to learn new words. One word in English may have different meanings in your language. e.g. hold. How would you translate these sentences?

*Hold* the handle.     *Hold* push-back for 10 minutes.
*Hold* the tool in place. The latch *holds* the door closed.
The aircraft is *holding*.     The cargo is loaded in the *hold*.

Translating each case may hide the basic sense which is common to all these uses of the word *hold*.
It is easier to understand and remember words when you see them in a context. Don’t worry if at the beginning you only have a rough, approximate idea of the word. You will see that precision comes with use and that in the meantime you will have learnt a lot.
Here are a few ways of placing words in their context, by association:

FAMILIES e.g. Vehicles
tanker, loader, car, truck, ambulance, bus, minibus, catering truck, tug, trolley...

SERIES/SEQUENCES e.g. Flight
push-back, taxiing, line-up, take-off run, rotation, lift-off, climb, level-off, cruise, descent, approach, final, flare, touchdown, roll-out, taxiing...

ASSOCIATION e.g. Brakes
apply, release, lock, cool, set, wear...

CONTRARIES
Push/Pull, Up/Down, In/Out, Long/Short, Heavy/Light, Black/White, Thick/Thin, Landing/Take-off, Top/Bottom, Wing Tip/Wing Root...

SYNONYMS
Perform/Carry Out/Do, Close/Shut, Aircraft/Plane, Flight Deck/Cockpit, Wheel Well/Landing Gear Bay, Check valve/Non-return valve...

VISUAL ASSOCIATION when you are working on the aircraft or using diagrams.

COMMON ROOTS e.g. Air
Aircraft, Airborne, Airbus, Airbrakes, Airfield, Airfoil, Airport, Airline, Airway...

Then invent your own ways. Make a game and a challenge of it. Make your own vocabulary more personal. Link it directly to your own experiences, knowledge, ideas, etc. Test yourself during the day – a few seconds from time to time. You will be surprised by the difference it makes!
**EXERCISE**

You will often find that more than one word is used for the same thing in technical language. Put together (match) the words with the same meaning.

| SMALL POD | TRIP (v) BAD | DEFECTIVE DEPRESS | GO BACK STOP | SOCKET REMAIN |
| GEAR BAY | U/S FLIGHT | INDICATOR LIGHT DISAGREEMENT | CORRECT MOUNT | STEADY DUE TO |

1. INOP
2. NACELLE
3. FIT
4. STAY
5. WHEEL WELL
6. SLIGHT
7. POP
8. CONTINUOUS
9. SHUT OFF
10. CAPTION LIGHT
11. CEASE
12. LEG
13. RETURN
14. POOR
15. PRESS
16. BECAUSE OF
17. DISCREPANCY
18. RECEPTACLE
19. RIGHT
20. FAULTY
EXERCISE
KEY
Only use this Exercise Key after completing an exercise. Sometimes there are two or more correct answers (e.g. C1 example 19).

A1

1/B 2/B 3/A 4/B 5/A 6/A 7/A 8/B 9/A 10/A

A2


N.B. Remember that usually only the last word in a compound expression can be plural (i.e. + s).

B1


B2


C1

2. Subject: the actuator assembly; Verb: has; Object: two electrical DC motors.
3. Subject: the aircraft attitude; Verb: is indicated; Means: by a sphere.
4. Verb: Do not touch; Object: the hot parts; Purpose/reason: to prevent burns.
5. Subject: this S/B; Verb: recommends; Object: the installation of shims; Purpose: to improve fatigue life.

E2
1. means 2. purpose, reason 3. subject 4. verb 5. object

E3
1. means 2. verb 3. subject 4. purpose, reason 5. object 6. purpose, reason
7. verb 8. purpose, reason 9. subject 10. means

E4
1. The rudder pedals are connected to the steering pedals.
2. The metering valve directs 3000 psi to the actuator.
3. The compressor section is the source of compressed air or The source of compressed air is the compressor section.
4. Seals are installed to prevent oil entering the system.
5. The sensor provides a signal to turn on the red warning.
6. The yaw damper systems controls the rudder to dampen yaw axis movement.
7. System pressure is supplied by two pumps.
8. Two pumps supply system pressure.
9. Pushing the push-button resets the system.
10. An electrical motor opens and closes the valve to control the fuel flow.

E5
1. A precooler controls the bleed air temperature.
2. Pushing LO, MED or MAX arms the autobrake system.
3. An attachment fitting attaches the seat unit to the seat tracks with two fasteners.
4. An electronic device inhibits the simultaneous selection of several transmitters.
5. The exciters transform the 115V-400 H2 current into high voltage, pulsating current to enable ignition.
6. The screen presents the main information to control the aircraft.
7. The precooler cools the hot air from the engine HP compressor by a heat exchange process.
8. A minimum upstream pressure of 8 psig is necessary to open the valve.
9. The lower section of the fuselage comprises 3 skin panels extending from frame 1 to frame 24.
10. Install the bolt with the screw, the washer and the nut.
11. The gear system permits one motor to drive the valve if the other motor does not operate.
12. Two green lines inside the speed scale indicate that the protection is available.
13. An anti-ice valve controls the air pressure at the required value.
14. Two switches give the position according to a logic.
15. The poppet valve moves on to the valve seat under spring pressure.

The filter bowl screws on to the flanged mounting. It contains the filter element and holds it against the mounting. A seal prevents leakage. The bowl is screwed tight by means of a square tightening lug on the bottom surface. The filter element has a support tube with a spigot which opens the inner valve when the filter element is fitted.
Filter power of the element is 15 microns (0.0006 in.).
The red clogging indicator is protected by a transparent cap which is integral with the mounting. The indicator becomes visible when any filter clogging causes pressure to drop to 6 bars (87 psi).

1. The gear can extend by freefall.
2. The overhead racks are mounted on the ceiling.
3. There is an interface between the fire detection system and the master warning controller.
4. Disconnect the return line from the case drain hose.
5. Any drop in voltage is detected by the voltage monitor.
6. The ATC transponder is electrically supplied but not operating.
7. Check that the doors are flush with the fuselage skin.
8. The amber magnetic indicator shows the valve is in transit.
9. The ground spoilers are armed before landing.
10. The aircraft symbol is slaved to a computer.

F1
1. igniter  2. restrictor  3. sends  4. loading  5. stabilizer  6. rocking lever
13. trailing edge  14. de-icing  15. the flight crew's papers  16. fire extinguisher
17. blanking cover  18. the passengers' names  19. extended  20. thrust reverser
G1
1. overspeed 2. unsafe 3. underpressure 4. input 5. counterclockwise
16. disagree 17. misadjust 18. crosswind 19. override 20. downlocked
21. turnaround 22. midspan 23. set-up 24. onload 25. downtime

REVIEW ONE

1. throttle levers 2. door handle 3. cabin windows 4. hydraulic reservoir
5. seat rails 6. ram air inlet 7. brake pedals 8. vertical speed indicator
9. proximity detector 10. fire handle 11. overhead panel 12. attendant station
13. fire detect loop 14. circuit breaker 15. push-button 16. servo-control
17. fuel pump 18. crossbleed valve 19. fan air valve 20. bleed air

CORRECTIONS
1. regulate 2. to protect 3. drive 5. drain 6. remove 8. is regulated 10. has
11. torque 12. monitors 13. smoking 16. is detected 17. increases 18. ("set"
is correct) to extend 19. are, check 20. released ("pulled" is correct)

3. seat rails 2. rear cargo door 3. containers 4. cross beams 5. escape slide
6. frames 7. aisles 8. bulk cargo door 9. attendant seat 10. stringers 11. ball
mat 12. row 13. antenna 14. aft passenger door 15. glass wool blankets
16. longerons 17. overhead baggage racks 18. door handle 19. cabin windows
20. seat unit

The other verbs are all correct.

4. press, depress, push, hold, maintain, release
2. illuminate, extinguish, come on, go off, turn on, turn off, switch on, switch off
3. pull, lower, turn
4. remove, install, set
5. trip, set, reset, pull, push, open
6. apply, release, set
7. set, turn, rotate, reset
8. tighten, loosen, torque, lock, turn, safety
9. connect, disconnect, insert, remove
10. advance, retard, pull, push
11. check, replenish, top up, top off
12. set
13. close, open, lock, latch, check
14. raise, lower, open, safety
15. fasten, unfasten
16. replace, extract, remove, repair, install
17. measure, increase, decrease, check
18. raise, lower, extend, retract, position
19. deploy, arm, disarm, inflate, deflate, fold, install, remove
20. rig, adjust, tighten, loosen, check

1. Support arm
The support arm is a cast light alloy box section with integral connection forks. Each connection fork is provided with standardized and replaceable bushes. The door is attached to the support arm by means of upper and lower connection links. The lower connection link is also connected to the lifting shaft of the door locking mechanism. An adjustable door buffer attached to the inner face of the support arm acts as a limit stop and shock absorber when the door is fully opened. A door stay mechanism installed in the support arm locks the door in the fully open position. The mechanism comprises a release button, actuating rod and lever, bellcrank, spring-loaded rod, and locking hook.

2. If the output voltage of the d-c regulator attempts to rise above 16 vdc, the emitter of Q2202 follows this rise decreasing the conduction through Q2202. The decrease in current through Q2202 results in the base voltage of Q2201 rising, which in turn, decreases the current through Q2201. The result is that the output voltage returns to 16 vdc.

3. General
The air bled from the fifth stage of the compressor passes through four duct sections and a line-mounted valve of the on-off type. At the forward bulkhead of the intake cowl, the anti ice system interfaces with the swirl nozzle in the intake lip. The spent air then enters the cavity of the intake cowl aft of the forward bulkhead. The air passes through holes in the inner cap of the bulkhead between the skin inner barrel and the bulkhead. Finally, the air exhausts overboard through the flush duct in the outer barrel. The airflow pressure is controlled by an anti ice valve which is of the butterfly type and electrically operated.

1. The mechanic fills the reservoir through the reservoir filling system to replenish the system.
2. A battery-buffer memory stores the selected track number for later use.
3. A crossfeed valve controls the fuel supply to the other wing.
4. The rod connects the lever to the cable with the turnbuckle.
5. A lever controls a device to open the doors on the ground without hydraulic power.
6. The aileron control system must be depressurized to prevent injury to personnel.
7. The ACFS also provides coordinated maneuvering to maintain or change attitude, altitude and heading.
8. When the flaps are retracted the valve directs pressure to the retract part on each actuator.
9. The L.P. fuel filter protects the fuel control unit from foreign material contamination.
10. The oil tank contains the supply of oil for the system.
11. A retaining ring holds the pane and the seals in position to make a pressure-tight joint.
12. A series circuit applies 28 VDC through the lower contacts to turn on the red light in the fire handle.
13. The STAB OUT-OF-TRIM indicators are amber lights on the pilot’s control panel.
14. A gate on the control quadrant prevents rapid movement of the control lever.
15. In the event of hydraulic power loss from both systems A and B the tab lock-out mechanism frees the elevator control tabs.

1. The wing tank pumps are located in a collector box formed by root Rib 1 and Rib 2. Rib 2 is sealed except for vent holes at the top and clack valves at the bottom through which fuel gravitates into the enclosure. Two inward-opening hinged panels in Rib 2 provide access into this area. This configuration makes sure that the pumps are fully in fuel during flight maneuvers. Each pump has an intake pipe fitted with a strainer. A bypass pipe with suction valve enables the engine to get fuel by suction if the pumps do not work.

2. The pump is of the variable-displacement type. The rotating assembly turns all the time that the engine operates. The pump has nine pistons which are connected to a moveable yoke plate. When the angle of the yoke plate changes, the stroke of the pistons changes and the output of the pump is increased or decreased. The compensator valve supplies servo pressure to the actuator piston, which controls the angle of the yoke. A solenoid valve (controlled from the flight compartment) makes it possible to change the operation of the pump so that it does not supply pressure to the system (depressurized mode). The EDP includes a blocking valve which isolates the pump from the hydraulic system when the pump operates in the depressurized mode.

3. Each pressure reducing valve includes a control piston which operates a distribution slide valve through a spring R1 and a rocker arm. When the pedal is released, the Yellow pressure at A is shut off and the brake port C is connected to the reservoir return B.

When the pedal is pushed in, the volume of fluid moved by the master cylinder causes the displacement of the piston which then operates the rocker arm and the slide valve; B is shut off and the pressure port A is connected to the brake port C. When line C is filled, the pressure pushes on the end of the slide valve (chamber D) which, through the rocker arm, causes the spring R1 to compress; the control piston remains in the same position.
1. tough, strong, resistant, robust  2. dark, heavy  3. flexible, pliable  4. dirty  5. smooth, calm  6. solid  7. volatile  8. curved, wavy;  9. matt  10. blunt, rounded

1. wire  2. landing gear, engine, struts, etc.  3. floor panels, control surfaces, galleys  4. seat covers, curtains  5. windows, windshield  6. skin panels  7. insulation, knobs, selectors, handles  8. tires, seals, stops  9. glasswool insulation covering  10. secondary structure, fairings, control surfaces

1. radome  2. windshield  3. pitot tube, probe  4. hose  5. bolt, screw

long/short thick/thin high/low wide/narrow short/long thin/thick low/high heavy/light light/dark or heavy deep/shallow shallow/deep narrow/wide


1. for  2. to  3. used  4. purpose  5. acts.  6. provides  7. enables  8. are
J3  
1. brake fans 2. busbar 3. jacks 4. airbrakes 5. passenger call button  
6. proximity detector 7. servocontrols 8. escape slide 9. armrest 10. pitot  
15. electrical pump 16. squib, cartridge 17. warning lights 18. seat rails  
19. overhead baggage racks 20. crossfeed valve

K1  
1. because 2. due to 3. moreover 4. although 5. since 6. so as to 7. unless  
8. even though 9. provided that 10. until

K2  
1. if 2. whereas 3. although 4. unless 5. moreover 6. but 7. furthermore  
8. however 9. due to 10. if 11. as soon as 12. until 13. in order to  
14. unless 15. however

K3  
1. if 2. due to 3. and 4. although 5. so 6. so as (to) 7. if 8. so 9. whereas  
10. but

K4  
1. yes 2. no/despite 3. no/so, therefore 4. no/in order to, so as to, to  
5. no/nevertheless, but

(NOTES pp 84-89)  
de-activated de-energizes depressing eased fastened filled fulfil(l)  
handle hoisted increases jacking leaves (left)/leave let marked matching  
mounting obey opening overrides planned postpone preset press pushes  
raised read, reads removes replace request required reset rigging  
rotating sent set shifted tightened trip used withdrawn

L  
1. connect 2. pressing, depressing 3. de-activated 4. set; check 5. fill  
6. remove 7. raise, remove, shift, withdraw 8. apply 9. trip, set, reset  
10. carry out 11. rotated 12. using 13. mounted 14. handle 15. required  
16. de-energize 17. increase 18. leave 19. match, connect, mark 20. jacked
ACROSS
1. alloy 2. wingspan 3. rig 4. no 5. up 6. bend 7. but 8. display 9. e.g.
17. ease 18. although 19. ed

DOWN
1. around 2. over 3. in 4. shift 5. as 6. handle 7. by 8. request 9. ing
18. tighten 19. push

17. G/function of a loader 18. Z/system that provides hot air 19. M/from side
to side 20. J/maintains itself 21. I/therefore 22. F/inboard 23. AD/permit,
enable 24. U/axis 25. E/forward part of wing 26. AA/but 27. B/used to

1. mandatory 2. counterclockwise 3. centerline 4. test 5. at/as 6. soft
7. should 8. whereas 9. depth 10. in order to 11. through 12. remove
13. reset 14. honeycomb 15. rubber 16. straight 17. rough 18. however
26. forward 27. must 28. request 29. crossfeed 30. although
1. hotter than 2. biggest 3. more ... than 4. more comfortable than 5. lower
6. fewer ... than 7. more efficient, the most efficient 8. longer ... than 9. same
10. whereas, while, whilst, but 11. lighter than 12. more efficient than
13. longest 14. highest 15. best 16. more cracked than 17. better ... than
18. more smoothly 19. less ... than 20. more accurate than 21. whereas, while,
whilst, but 22. shorter ... harder 23. the fastest 24. more ... than 25. higher ...
hotter 26. as powerful as 27. better ... than 28. longer ... better 29. as large as
30. as much as

1. insert, position 2. surrounds 3. dismantle 4. vibrating 5. drops, decreases
6. spreads, runs 7. slides, runs 8. advance 9. lift 10. expands 11. reach
12. deflects 13. sweep 14. entered, sent, inserted 15. run 16. sends,
transmits, conveys 17. tilted 18. wound, coiled 19. position, slide, revolve
26. bypasses 27. shrink 28. decrease 29. cranked, motored 30. protrude

1. deflect 2. retard 3. tilt 4. wind 5. drift 6. sweep 7. retract 8. tow

1. The Fan Air Valve controls the fan air flow.
2. The unit is connected to (the) ground.
3. The air intakes must be inspected for any damage.
4. The outboard control valve quadrant activates the control cables.
5. The weather image may be displayed on the ND.
6. Three screws maintain the panel in place.
7. The master switch must be set to OFF.
8. Voltage and frequency are monitored.
9. Three hydraulic systems power the servos.
10. Drum travel is limited by a stop.
11. The take-off warning horn is activated by the EPR.
12. An over-temperature illuminates the light.
13. The rudder pedals can be adjusted with a screw.
14. The RESET push-button re-aligns the system.
15. The trim wheel can be rotated 3 turns in either direction.
16. Air leak protection is provided on the hot air ducts.
17. An optical sensor detects smoke.
18. The thrust levers must be safetied and placarded.
20. Safety the C/B or you must safety the C/B.
1. check, test  2. consists  3. compute, calculate, assess  4. both  5. lasts, takes  
6. include  7. occur, happen, take place  8. informs, advises  9. enables, allows,  
permits  10. tested, checked  11. event, case  12. displays, indicates  13. much  
14. prevents  15. mounted  16. reads, indicates  17. scans  18. from ... to  
19. either  20. scale, display  21. informs, notifies  22. embodied, applied  
23. each  24. inspect, examine, check  25. during  26. indicates  27. estimated  
28. takes  29. fitted, provided, equipped  30. enable, allow  

**S1**

(STATES)  
1. released  2. clean  3. tripped  4. safetied  5. shut  6. in transit  7. torqued  
8. held  9. hot  10. earthed  11. trip ... open  12. set to  13. cleared  
14. deployed  15. secured  16. armed  17. full  18. applied  19. flashing  
20. flush  

**S2**

(STATES)  
1. stowed  2. extinguished  3. reset  4. safeguarded  5. upgraded  6. grounded  
7. stored  8. nose-up  9. loose  10. isolated  

**S3**

(FAILURES AND DAMAGE)  
1. lightning strike  2. transient  3. stiff  4. noise  5. incidents  6. distorted  
13. drift  14. out of phase  15. contamination  16. harmful  17. jam, jamming  
18. overpressure, overtemperature  19. downgrading  20. overfill  21. failure  
22. wear  23. seepage  24. chunks  25. wheel locking  26. spillage  
27. malfunction  28. surge  29. chip  30. peeling  

**S4**

(FAILURES AND DAMAGE)  
1. circuit closed  2. door latched  3. out of phase  4. autopilot armed  5. tire  
worn  6. aircraft banked  7. brakes applied  8. tire cut  9. breaker safetied  
10. fuel leak  11. dent on leading edge  12. tank full  13. thrust reverser  
released  18. pin sheared  

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REVIEW THREE


2. tighten/loosen decrease/increase close/open over/under push/pull upper/lower deploy/stow set/trip incoming/outgoing serviceable/inoperative clockwise/counter-clockwise single/twin or double nose/tail on/off remove/install air intake/exhaust high/low extract/insert release/apply go ahead/hold energize/de-energize inner/outer full/empty drain/top up tight/loose landing/take-off raise/lower root/tip

3. AIR CONDITIONING: overheating, leak, overflow, surge.
ENGINE: hung start, shutdown, imbalance, overspeed, flame-out, surge, seepage, stall, chip, vibration, contamination, fire.
STRUCTURE: corrosion, F.O.D., wear, bird strike, sheared, dent, crack, distorted, loose, fretting, stain, peeling, chafing, tarnished, scratch, crazing, rubbing.
TIRES: wear, blister, deflated, cut, blown, chunking, skid mark, tear, burst.
ELECTRICAL POWER: out of phase, short circuit, noise, runaway, overload, flashover, tripped, discharge, transients, drift.
FLIGHT CONTROLS: jam, clogged, locked, stiff, runaway, play, missing, asymmetry, drift.

T1

T2

U1

W1

W2

Y1
ACROSS

DOWN
EXERCISE KEY

Y2
1. AS PER  2. ETA  3. ASWR  4. RCMD  5. ADV  6. ABD, O/B  7. FLT
29. CK  30. KT  31. ASAP  32. A/C  33. WILCT  34. SKED  35. ACK
36. BLK  37. A/L  38. UNKN  39. DEL  40. RUSHR

Y3
EXTRACT ONE
1. LH bleed valve  2. No, in flight  3. No, a hose is for fluids  4. subsequent =
   following  5. the engine  6. discrepancy  7. downstream  8. a plate  9. start
   again

EXTRACT TWO
1. No: a QRP  2. No: measure = action, step  3. transferred  4. crossed over

EXTRACT THREE
1. prior to  2. run  3. all  4. untimely  5. dropped  6. bleeds  7. manual
   8. ramp  9. delayed

EXTRACT FOUR
1. Yes  2. tires  3. the procedure  4. Iberia engineering

EXTRACT FIVE
1. gate  2. due to  3. stuck  4. as  5. deactivated  6. replaced

EXTRACT SIX
1. leaving  2. repetitive  3. sounded  4. came on  5. both  6. remained
   7. diverted  8. revealed  9. cautionary  10. replaced

EXTRACT SEVEN
1. system  2. pressurization  3. cabin rate of climb  4. -500 ft/min  5. No, it
   increased.  5. Yes, but it had no effect.  6. By switching to system 1.  7. No,
   there were 3 previous cases.

REVIEW FOUR
1. longer  2. heaviest  3. deflected, moved  4. actual  5. few  6. each
   7. stowed, housed, located  8. to  9. play or clearance  10. or  11. insulated
   17. during  18. locked  19. results  20. tied  21. prevents  22. counterclockwise
   23. applies, releases, sets  24. turn  25. clean  26. flashing, pulsing
   27. replenished  28. consists  29. both, all  30. displayed  31. tripped, popped
   32. reset  33. takes  34. cancelled  35. flush

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1. drop 2. thin 3. between 4. extinguish 5. ed 6. over 7. rig 8. play 9. copper 10. supply 11. clockwise 12. alloy 13. clean 14. rough 15. lower 16. flush 17. straight 18. inlet 19. cross-check 20. feedback 21. trailing 22. printer 23. sensing 24. through 25. set 26. driven 27. worn 28. at 29. both 30. let 31. are ... heated 32. cancel 33. from ... to 34. crosswind 35. poor 36. purpose 37. lock 38. insulation 39. due to 40. downstream 41. can 42. unlocked 43. handle 44. as 45. reset 46. stiff 47. may 48. so 49. greater ... greater 50. de-energize 51. whereas 52. narrow 53. blanking 54. drift 55. moreover 56. over 57. deflect 58. retard 59. takes, lasts 60. less 61. steady 62. malfunction 63. inch 64. highest 65. lengthen 66. together 67. release 68. tighten 69. knot 70. sliding 71. as soon as 72. increase 73. strike 74. either 75. secured 76. overheat 77. consists 78. add 79. out of 80. little 81. dustfree 82. displays 83. flashing 84. self-locking 85. some 86. fire-proof 87. top 88. prevents 89. each 90. if/as 91. actual 92. shall 93. line-replaceable 94. so 95. slash 96. air-cooled 97. air bleed 98. hinged 99. previous 100. last

This index refers to pages which contain a short explanation, definition or illustration of the word in question.

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