Take Flight

toward a career in aviation and aerospace

Essential Skills Volume 1 - Document Use

FOR USE WITH THE AVIATION AND AEROSPACE ORIENTATION PROGRAM

Acknowledgements

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Using the Aviation and Aerospace Orientation Program Essential Skills Workbook

The Aviation and Aerospace Orientation Program Essential Skill workbook is not intended for use as a self-directed independent learning tool. It has been designed to augment the Aviation and Aerospace Orientation Program curriculum and support the learner in attaining Essential Skills that are paramount for success in the workforce. The activities serve to strengthen foundational skills and reinforce basic concepts.

There may be activities in the workbook that require students to solve mathematical calculations or respond with a long passage. While there is space allotted for the activities within the workbook, it may be necessary for the student to work on a separate page/notebook.

Where applicable the workbook is accompanied by an Answer Guide containing sample answers/responses. These Answer Guides also cross-reference the workbook topics to the Aviation and Aerospace Orientation Program curriculum.

Table of Contents

Section One: Document Use in Aviation Maintenance

Document literacy is the ability to give or acquire information in a format other than the formal written text. Signs and symbols give directions and warn of danger. Charts, graphs, sketches, drawings and schematics are methods used in aviation maintenance to ensure proper procedures are used in the completion of a maintenance task.

This workbook will take you through a maintenance procedure on a helicopter, which will help you understand the importance of document literacy.

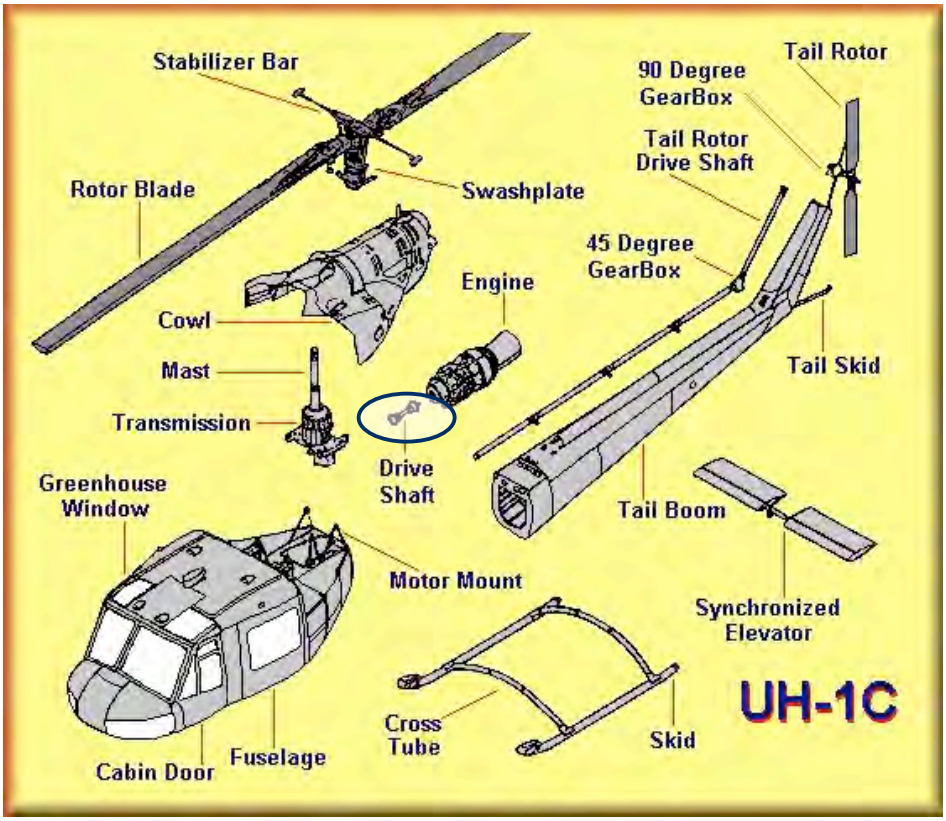
The main power driveshaft of the helicopter connects the engine to the transmission (see Figure 1-1 and 1-2). Due to the aerodynamic forces on the main rotor system and transmission, they require a certain amount of flexibility and movement, whereas the engine is hard mounted to the frame of the helicopter. The design of the driveshaft (Figure 1-3) allows for this movement without disturbing the hard engine mounts. However daily inspection for premature metal fatigue and part failure must be carried out as well as periodic maintenance on the driveshaft's flexible ends.

Activity 1-1 – Student's Challenge

Imagine you are an Aviation Maintenance Technician/Engineer (AMT/AME). Your task is to remove, clean, inspect, condition, lubricate and reinstall the driveshaft on a Bell helicopter.

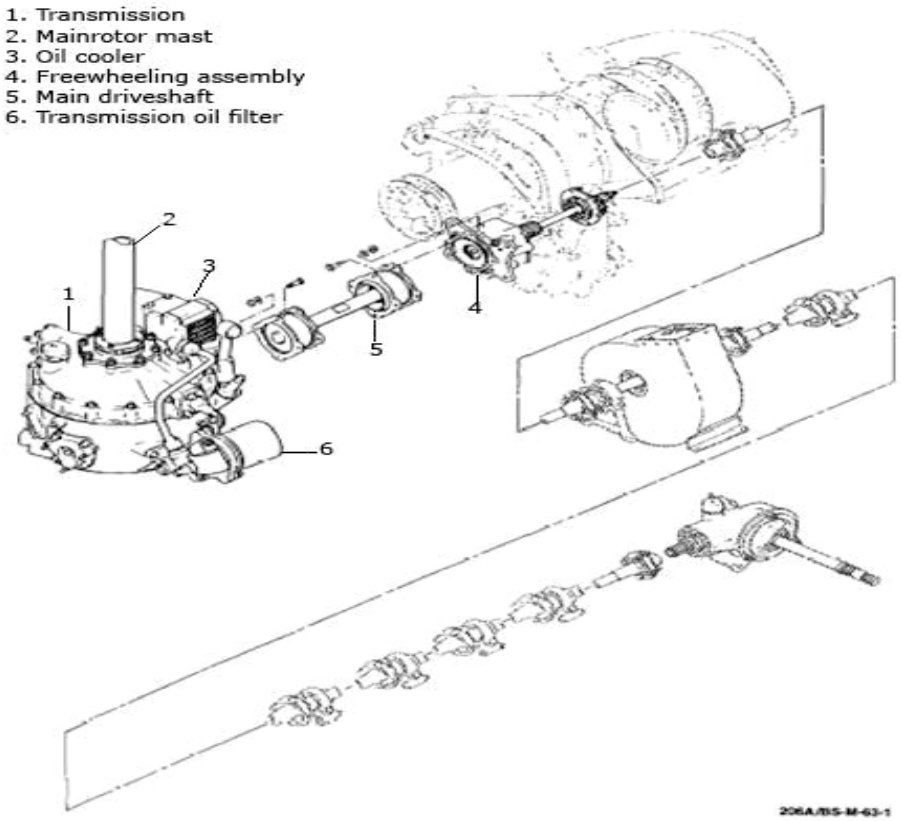
1. Use flight log to determine flight time for inspection.
2. Use ATA codes to determine chapter and subsection of manual.
3. Identify scope of task from drawings and procedures in manual (mimetic documents).
4. Use Workplace Hazardous Materials Information System (WHMIS) symbols and Material Safety Data Sheets (MSDS) sheets for safety information for required lubricants.
5. Use graphs and charts to perform maintenance check.

Figure 1-1 – Driveshaft



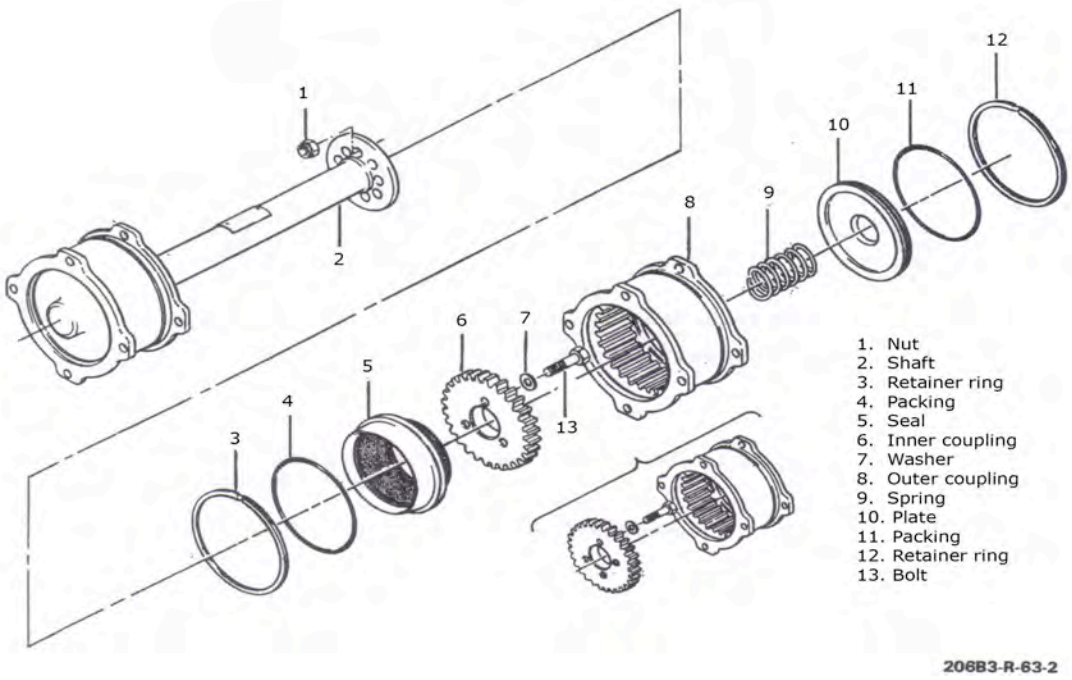
(Graphic reproduced with permission from G. Bloom, source: www.helicopterpage.com/images/parts.jpg)

Figure 1-2 – Main Power Driveshaft



(Assembly drawing reproduced with permission from Bell Helicopter)

Figure 1-3 – Design of Driveshaft



(Assembly drawing reproduced with permission from Bell Helicopter)

Section Two: Information Search

Logbooks

In order for an aircraft to legally fly in Canada it must have two current logbooks. One is for the pilot to document all of the flights including where the flight takes place, the duration, the total accumulated flight time since the aircraft was new and a record of the crew. The second document is a technical logbook, completed by the aircraft maintenance technician/engineer (AMT/AME), used to record all maintenance procedures, changes to the aircraft and a projected maintenance schedule.

Every aviation company has its own method of recording this important flight and maintenance information. The log sheet (on the following page) is for a Bell 206 Jet Ranger helicopter which will require a main driveshaft maintenance procedure when it reaches 3297 total flying hours.

Activity 2-1 – Using Forms

Use the VIH Journey Log Sheet and Maintenance Status Card (Figure 2-1), to answer the following questions:

1. How many items or information boxes are there on the journey log?

2. How many boxes pertain to the pilot?

3. How many boxes pertain to the aviation maintenance technician?

4. Is the pilot qualified to do the daily check?

5. What is the registration of this helicopter?

6. If 1000 hours of flight time is considered a fairly new machine and 20,000 hours an old one; what is this helicopter?

VIH Helicopters Ltd.
Send yellow copies to:
Heavy Helicopters – North Saanich
Light, Intermediate, Medium – Pr. George

JOURNEY LOG

A/C REG. C-GABZ | 3282.5 | TOTALS CARRIED FORWARD 1,561 | 10 | 11 2170 | 12 1972 | PAGE 01

1 DATE 20 08	2 DAILY CHECK C/O INITIALS	3 NAMES	4 FROM / TO	5 MISC TIME	6 AIR TIME	7 TOTAL AIR TIME SINCE MANUFACTURE	8 FLIGHT TICKET NUMBERS	STARTS N1	STARTS N2	LAND ING	LOADS LIFTED	13 SIGNATURE AND PILOT LICENCE NUMBER
JULY 10	MC	MIKE CHENIER	VANCOUVER	.5	2.0	3284.5	BC-14792	1		1	—	MChenier YZC 11837
12	MC	MIKE CHENIER	VAN-BELLACOLA	—	3.0	3287.5	BC-14792	1		2	—	"
12	MC	MIKE CHENIER	BELLACOLA	-	2.5	3290.0	BC-14792	2		4	—	"
12	MC	MIKE CHENIER	BELLA-GALIANO ARM	.2	1.8	3291.8	BC-14792	1		1	—	"
12		MIKE CHENIER	LOCAL		.5	3292.3	TOWER CHECK	1		1	—	MChenier YZC 11837

14 TOTAL AIR TIME SINCE MAN.	POWER CHECK			N1 / NG	TURB TEMP (HP - A350)	TORQUE	15	16	17	18	Power checks required every 5 flight entries
3292.3	P / ALT (29.92)	3,000	ENG #1	93%	700°	80%	SINGLE ENGINE RESULT OK	TOTALS TO CARRY FORWARD			
	OAT	+20	ENG #2				TWIN ENGINE RESULTS	ENG #1 N1 NG	TURB TEMP	ENG #2 N1 NG	TURB TEMP

19 DATE 20 08	16 TOTAL AIR TIME SINCE MAN.	17 DEFECT NO. MM/DD	18 OBSERVATIONS / DEFECTS / WORK PERFORMED	19 CERT CODE	20 SIGNATURE AND RATING AME ASE NUMBER OR PILOT LICENCE NO.
JULY 12	3292.3		POWER CHECK CARRIED OUT.	MR	MChenier VIN 612600
@	3298.0		DRIVE SHAFT RE & RE		
JULY 12	3291.8		STARBOARD POSITION LIGHT U/S AND REPLACED NEW	MR	MChenier VIN 612600

DO NOT REMOVE WHITE COPY FROM BOOK — SEND YELLOW COPY TO APPROPRIATE LOCATION AT TOP OF PAGE WHEN PAGE IS COMPLETED AND AT MONTH END

MAINTENANCE STATUS CARD (Part B)

This card shall accompany the Journey Log at all times — A/C Reg

Type	Regular Inspections	Hours
Last 100HR INSP.	Done @	3205.2
50HR	Due @	3255.2
100 HR INSP	Due @	3305.2
	Due @	
	Due @	

Due Items – Components - inspection / O/H / retire, torque checks, extentions, compass swing, date due items etc.	Power checks required every 5 flight entries
(ITEM)	Due
DRIVE SHAFT RE-RE	Due 3298.0
COMPRESSOR	Due 3500.0
TURBINE	Due 3500.0
MAIN ROTOR STRAPS	Due SEPT 15, 2008
FIRE EXTINGUISHER	Due OCT 1, 2008
002B-2	Due

MAINTENANCE STATUS CARD (Part B)

This card shall accompany the Journey Log at all times — A/C Reg

Type	Regular Inspections	Hours
Last	Done @	
	Due @	
	Due @	
	Due @	
	Due @	

Due Items – Components - inspection / O/H / retire, torque checks, extentions, compass swing, date due items etc.	Power checks required every 5 flight entries
(ITEM)	Due
	Due
	Due
	Due
	Due
	Due
002B-2	Due

Figure 2-1 – VIH Journey Log

7. How many hours did Mike fly on July 12th?

8. Where did this helicopter spend the night of July 12th?

9. Describe flight number 2 with respect to start(s) and landing(s).

10. How many more hours can this helicopter fly before the driveshaft maintenance procedure must be carried out?

11. If this machine averages 5 flight hours per day, when should this maintenance procedure be carried out?

12. If this Bell 206 Jet Ranger is considered a light helicopter, what VIH office would this log information be sent to?

13. Is this helicopter a single or twin engine helicopter?

14. Complete box 7 and box 9.

15. What was the result of the engine power check ("O.K." or "Fail")?

Section Three: Read Tables and Lists

ATA Codes

Maintenance Manuals are so detailed they fill dozens of binders to support one aircraft. An international organization, Air Transport Association (ATA), got together with all the major aircraft manufacturers who agreed to organize their manuals so AMTs/AMEs can quickly source systems information using codes.

The codes begin with chapters pertaining to regulations and publications and general information (e.g., scheduled maintenance, lifting procedures, placards, standard practices). Then they become more specific with respect to chapters on systems like airframe, power plant, flight controls, electrical, hydraulic, pneumatic, etc. Each specific chapter is then further broken down into sub-systems and coded accordingly.

Example:

Chapter 24

24-00-00	Electrical Power
24-10-00	Generator Drive
24-20-00	AC Generation
24-30-00	DC Generation

Chapter — Sub-System — Details within sub-system

Therefore, anything electrical would be found in Chapter 24, and information on the DC Generator would be found in Chapter 24, within subsection 30. The ATA Codes will direct you down to the specific information as efficiently as possible.

Activity 3-1 – Information Search

1. Using the ATA Codes Index (Table 3-1), fill in the blanks below:

	Chapter Number	Title
a.	_____	Airworthiness Limitations Schedule
b.	_____	Weight and Balance
c.	_____	Servicing
d.	_____	Fire Protection
e.	_____	Fuel System
f.	05	_____
g.	07	_____
h.	32	_____
i.	35	_____
j.	63	_____

2. What chapter and title pertain to the main power driveshaft?

_____

Table 3-1 - ATA Codes Index

Chapter	Title
01	Regulations, Publications, Ethics and Responsibilities
02	Academic Subjects
03	Aircraft Basic Sciences
04	Airworthiness Limitations Schedules
05	Time Limits/Maintenance Checks
06	Dimensions and Areas
07	Lifting and Shoring
08	Levelling and weighing
09	Towing and Taxiing
10	Parking and Mooring
11	Required Placards
12	Servicing
13	Unassigned
14	Equipment Operation (Unassigned)
15	Training (Unassigned)
16	Unassigned
17	Unassigned
18	Vibration and Noise Analysis
19	Unassigned
20	Standard Practices Airframe
21	Air Conditioning, Air Distribution and Ventilation
22	Auto Flight
23	Communications
24	Electrical Power
25	Equipment and Furnishings
26	Fire Protection
27	Flight Controls (Fixed Wing)
28	Fuel
29	Hydraulic Power
30	Ice and Rain Protection
31	Instruments
32	Landing Gear
33	Lights
34	Navigation
35	Oxygen
36	Pneumatics
37	Vacuum
38	Water and Waste
39	Electrical Panels (Unassigned)
40	Unassigned
41	Water Ballast
42	Integrated Modular Avionics
43	Unassigned
44	Cabin Systems
45	Central Maintenance System
46	Information Systems
47	Inert Gas System
48	Unassigned
49	Airborne Aux Power
50	Accessory Compartments
51	Standard Practices and Structures
52	Doors
53	Fuselage
54	Nacelles/Pylons
55	Stabilizers
56	Windows
57	Wings
58	Unassigned
59	Reserved for Airline Use
60	Standard Practices Propeller/Rotor
61	Propellers/Propulsion
62	Main Rotor
63	Main Rotor Drive System
64	Tail Rotor
65	Tail Rotor Drive System
66	Folding Blades/Pylon
67	Flight Controls (Rotary Wing)
68	Unassigned
69	Unassigned
70	Standard Practices Engines
71	Powerplants
72	Engine Turbine/Turbo Prop, Ducted Fan/Unducted Fan
73	Engine Fuel and Control
74	Ignition
75	Air Systems
76	Engine Controls
77	Engine Indicating
78	Exhaust
79	Engine Oil Systems
80	Starting
81	Turbines
82	Water Injection
83	Accessory Gearbox
84	Propulsion Augmentation
85	Unassigned
86	Unassigned
87	Unassigned
88	Unassigned
89	Unassigned
90	Unassigned
91	Charts
92	Unassigned
93	Unassigned
94	Unassigned
95	Instrument Systems (Reserved for Airline Use)
96	Electrical Systems (Reserved for Airline Use)
97	Avionics (Reserved for Airline Use)
98	Wiring Diagrams (Reserved for Airline Use)
99	Unassigned
100	Unassigned

Section Four: Read Schematic and Assembly Drawings

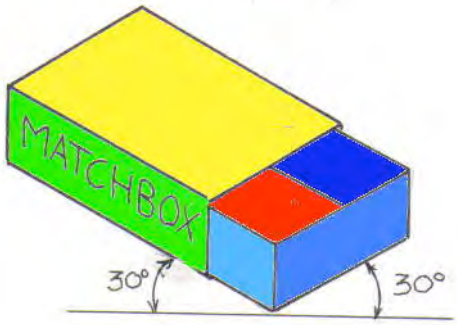
Mimetic documents, as the name suggests, mimic the appearance of the thing they illustrate. Mimetic documents include photographs, drawings, blueprints, diagrams and schematics. In many cases, mimetic documents convey information about the appearance, dimensions, spatial arrangement and functioning of things more effectively than text.

Three-Dimensional Representations

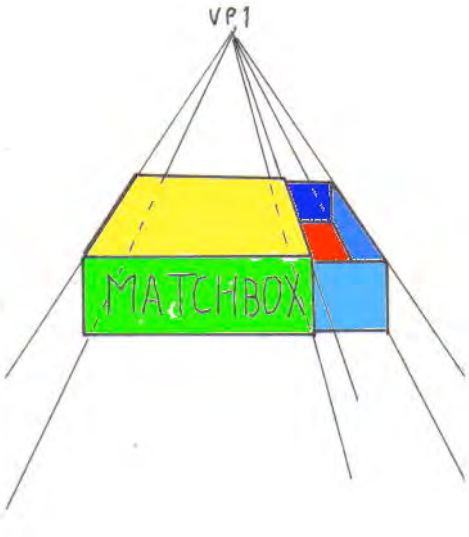
Drawings are used instead of photographs because it is easier to reduce the level of detail and emphasize a few important features. There are different types of three-dimensional representations. The most common ones are oblique projection, isometric projection and perspective drawings.

Figure 4-1 – Representation Drawings

Oblique Projection Drawing



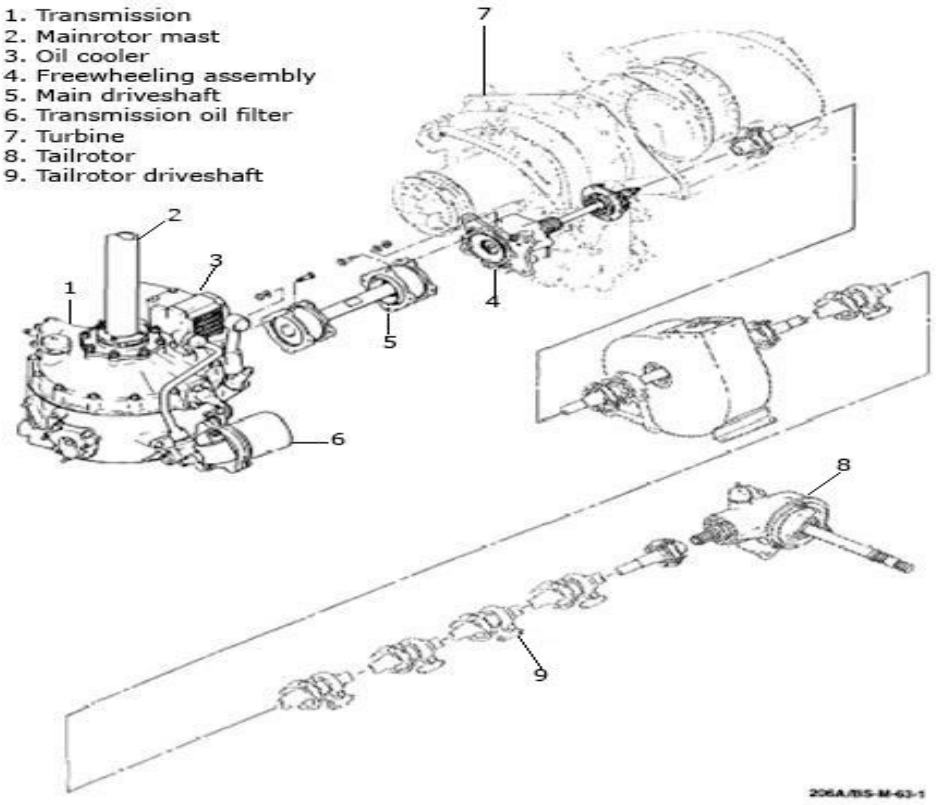
Isometric Projection Drawing



Perspective Drawing

Most three-dimensional drawings found in aviation manuals are isometric projections. A common variation of the isometric projection is the exploded drawing used to show how something is assembled. The exploded drawing shown in Figure 4-2 is comprised of different components. Different line types are required to complete a drawing. These line types are used to indicate outlines, hidden objects, order of assembly and connecting text to items or areas on a drawing. Other than lines, text is also found on drawings. Text in word or numeric form is used to describe, identify, number and quantify items or areas on a drawing.

Figure 4-2 – Driveshaft Assembly



(Assembly drawing reproduced with permission from Bell Helicopter)

In Figure 4-2 we find numbers pointing to parts and those same numbers are also found in a parts list at the top of the drawing. This drawing also contains dashed lines representing the alignment and assembly of these parts.

Example: Follow the shaft rotation forward from turbine (part 7) to the transmission and main rotor shaft through part 5 and rearward from the turbine through the tailrotor driveshaft (part 9) to tailrotor gearbox (part 8). What is part 5?

The following pages are taken from the Bell 206 Maintenance Manual and pertain to the main driveshaft lubrication. Note the instructions are in chronological order, short sentences beginning with a word like "remove", "clean", or "inspect" and refer to a part number on an isometric drawing (see the following three pages – Figure 4-1*).(*Note: In the actual manual, the drawing is between the instructions. For ease of use, we have kept the instructions together.)

Activity 4-1 – Reading Instructions and Assembly Drawings

1. Do you think parts number 3 and number 11 are the same and can be interchanged?

2. What is to be done with parts number 4 and 9 "packing" (o-rings)?

3. Detail "A" on the drawing pertains to what number instruction?

4. What part number fits into the outer coupling "8"?

5. How much grease is applied to the inside teeth of part number 8?

6. Are both ends of this shaft the same?

7. What caution is given regarding the assembled driveshaft?

8. What are you looking for during the inspection phase?

9. If defects are noted, what are you instructed to do?

10. What code is given to the special grease you must use?

Figure 4-3 – Main Rotor Drive System

MAIN ROTOR DRIVE SYSTEM

63-1. MAIN DRIVESHAFT.

63-2. MAINTENANCE.

63-3. Lubrication.

MATERIALS REQUIRED

NUMBER	NOMENCLATURE
C-015	Lubricant (Tube Pack)

NOTE

This procedure is to be used for lubrication of main driveshaft when specified by lubrication chart.

1. Remove retainer ring (3, figure 63-1) from inboard end of outer coupling (8).

2. Remove outer coupling (8) from seal (5) and spherical inner coupling (6). Index mark outboard end of outer coupling and inner coupling.

3. Remove retainer ring (11) from outer end of outer coupling (8).

4. Remove plate (10) with packing (9) and spring (7) from outboard end of outer coupling.

5. Discard packings (4 and 9).

6. Repeat above instructions for disassembly of coupling assembly on other end of shaft.

NOTE

Further disassembly is not required. It is recommended that removed parts be reassembled in the same position on the driveshaft assembly.

CAUTION

DO NOT WASH ELASTOMERIC BOOT, OR ASSEMBLED DRIVESHAFT IN SOLVENT.

7. Clean removed outer coupling (8) by wiping with clean dry cloths.

8. Clean inner coupling (6) by wiping with clean dry cloths.

9. Inspect driveshaft as follows:

a. Visually inspect all parts for damage and wear.

b. Inspect teeth of inner coupling (6) for chipped, cracked, or worn teeth and for acceptable tooth wear pattern (paragraph 63-6).

NOTE

After inspection of the outer coupling (8), ensure that zinc chromate stripes have been replaced with temp-plates. Zinc chromate stripes are no longer required as overtempature indicators. Refer to paragraph 63-6 for temp-plates installation procedures.

c. Inspect inner teeth of outer coupling (8, figure 63-1) for chipped, cracked, or worn teeth. Inspect "Temp-Plates" (figure 63-2.a) on outside of coupling for overtemperature indication, deterioration, debonding, missing temp-plates or excessive discoloration of the epoxy adhesive overcoating. If wear, discoloration, or any other defect is noted, refer to paragraphs 63-6 and 63-7, for limits and corrective action.

d. Inspect seal (5, figure 63-1) for cracks, tears or wrinkles and wear. Inspect both inner and outer surfaces for wear. No defects permitted. If boot portion of seal becomes detached from metal cone, it is not cause for replacement (paragraph 63-6).

e. Inspect parts for nicks and scratches (paragraph 63-6).

f. Inspect spring (7, figure 63-1) for free standing height of approximately 1.900 in. (48.26 mm).

10. Apply a light coating of lubricant (tube pack) (C-015) to packing (4, figure 63-1). Position packing in groove in outer edge of seal (5).

(Reprinted with permission from Bell Helicopter)

11. Position inner coupling with shaft attached, in outer coupling. Fit seal into recess in coupling using care not to damage packing. Install retainer ring into outer groove of coupling.

12. Apply lubricant (tube pack) (C-015) to internal splines of outer coupling (8, figure 63-1) to depth of 0.20 to 0.30 in. (5.08 to 7.62 mm) while holding inner coupling against seal (Detail A).

13. Apply a light coat of lubricant (tube pack) (C-015) to packing. Install packing in groove of outer rim of grease retainer plate.

14. Position shaft centering spring inside outer coupling and against end of shaft. Place plate (10) into outboard end of outer coupling and compress shaft center spring. Secure with retainer ring in groove on outboard end of outer coupling.

15. Repeat steps 10. through 14. on opposite end of shaft.

16. Wipe all lubricant and oil from outer surface of assembled shaft.

63-4. Disassembly.

1. Remove retainer ring (3, figure 63-2) from inboard end of outer coupling (8).

2. Remove outer coupling (8) from seal (5) and inner coupling (6). Index mark outboard end of outer coupling and inner coupling.

3. Remove retainer ring (12) from outer end of outer coupling (8).

4. Remove plate (10) with packing (11) and spring (9) from outboard end of outer coupling.

5. Remove bolts (13), washers (7), and nuts (1) attaching inner coupling (6) to flange on shaft (2). Hold nut with wrench to prevent nut turning with bolt and scoring shaft. Release of shaft from inner coupling will also release seal (5) which is assembled on end of shaft.

NOTE

It is recommended that all parts removed be reinstalled in the same position on the driveshaft as previously installed except as otherwise noted.

6. Repeat above instructions for disassembly of coupling assembly on other end of shaft.

63-5. Cleaning.

MATERIALS REQUIRED

NUMBER	NOMENCLATURE
C-304	Solvent

1. Clean driveshaft parts, except seals, with solvent (C-304).

2. Dry parts with filtered compressed air.

3. Clean seals (5, figure 63-2) with clean, dry cloth.

63-6. Inspection.

MATERIALS REQUIRED

NUMBER	NOMENCLATURE
C-309	Methyl-Ethyl-Ketone (MEK)
C-311	Adhesive
C-423	Abrasive Cloth or Paper
C-500	Crocus Cloth

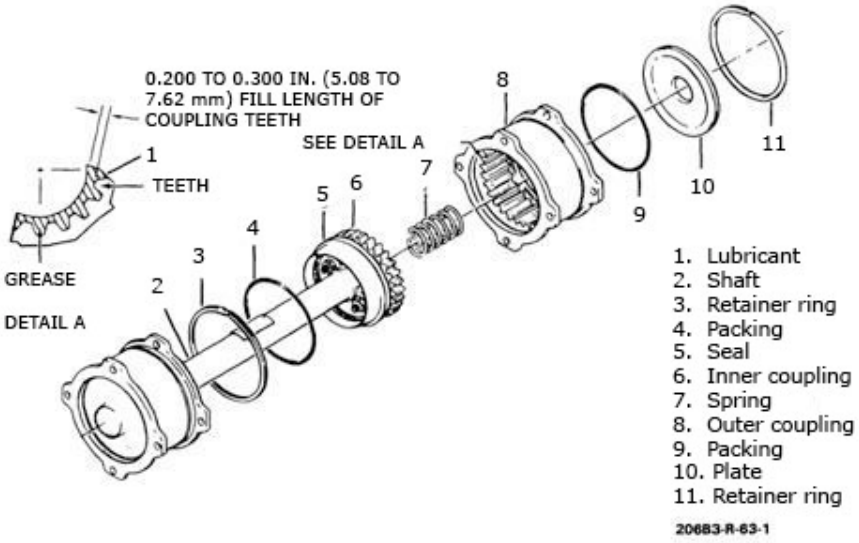


Figure 63-1. Main driveshaft lubrication

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Section Five: Read Signs, Symbols and Labels

Signs and Symbols

Signs and symbols are extremely. A red traffic light has a meaning we all know – STOP, and green we know as – GO. The aviation industry uses signs and symbols to direct and warn us. They direct us to follow proper procedures and warn us of possible dangers. Figure 5-1 (following 5 pages), identifies the location of placards, signs and symbols.

Activity 5-1 – Interpreting Signs, Symbols and Labels

Using Figure 5-1 as a location guide and accompanying descriptions, answer the following:

1. What is the description of the graphic at location 5 and location 6?

2. What is the description of the graphic at location 13?

3. What is the description of the graphic at location 14?

4. What is the description of the graphic at location 25 and where would you find it in the helicopter?

5. What is location 11? How much weight can be placed at location 11?

Figure 5-1 – Placards and Markings

BHT-206A/B-SERIES-MM-2

Bell Helicopter
A Textron Company

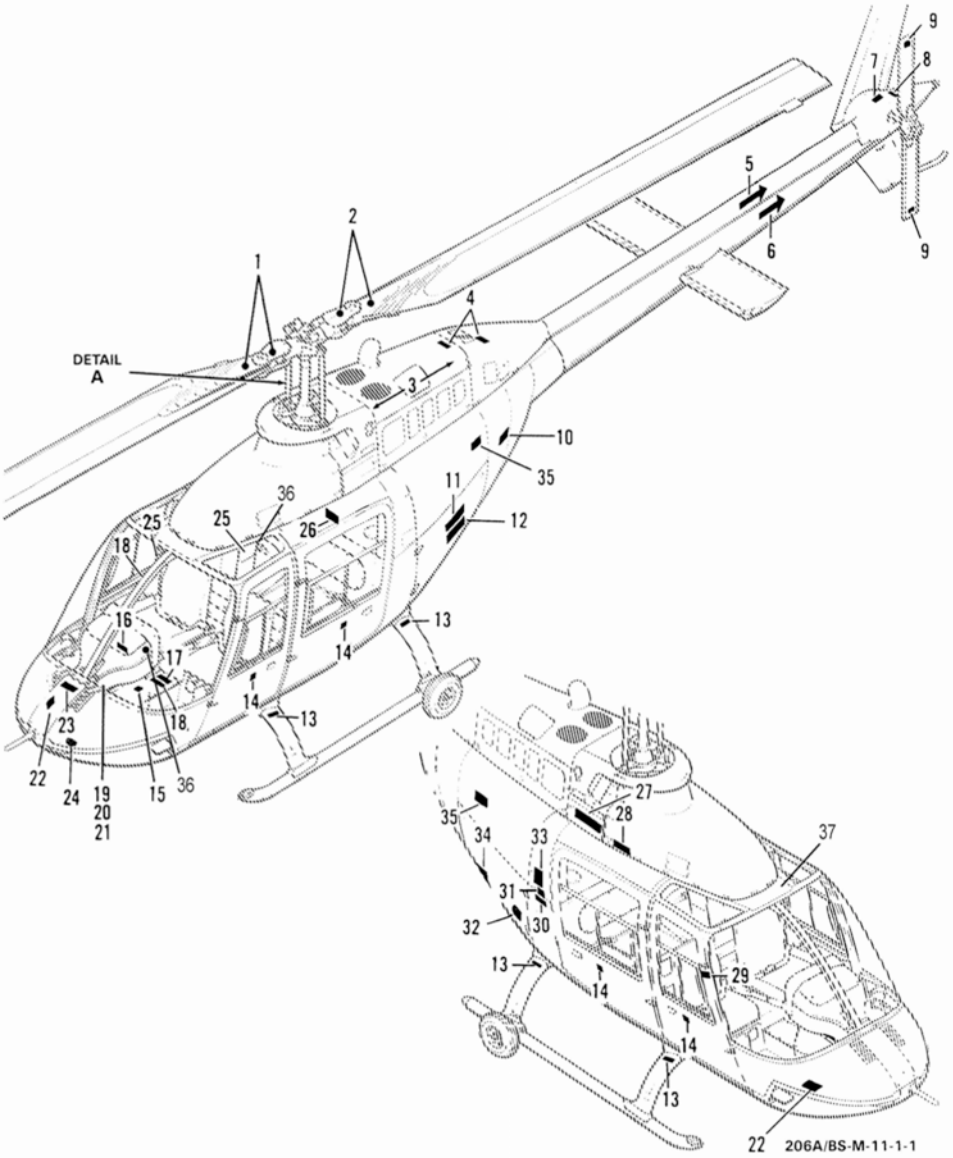


Figure 11-1. Placards and markings (Sheet 1 of 10)

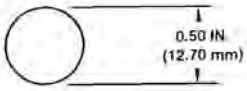
11-00-00
Page 4 Rev. 3 12 JUL 2004

(Reprinted with permission from Bell Helicopter)

BHT-206A/B-SERIES-MM-2

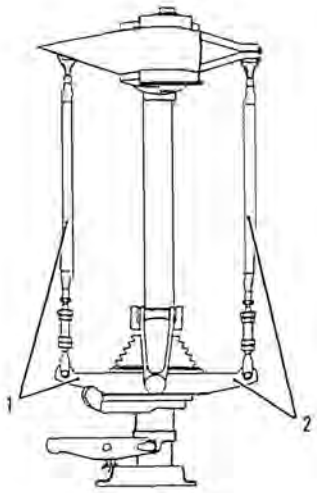
COLOR: RED
LOCATION:
1. UPPER AND LOWER SURFACES OF MAIN ROTOR HUB GRIP (TWO REQUIRED)
2. UPPER AND LOWER SURFACES OF MAIN ROTOR BLADE GRIP PLATES (TWO REQUIRED)
3. MAIN ROTOR PITCH LINK (TWO REQUIRED)
4. SWASHPLATE ROTATING RING (TWO REQUIRED)

1. Decal, spot, color coding



COLOR: WHITE
LOCATION:
1. UPPER AND LOWER SURFACES OF MAIN ROTOR HUB GRIP (TWO REQUIRED)
2. UPPER AND LOWER SURFACES OF MAIN ROTOR BLADE GRIP PLATES (TWO REQUIRED)
3. MAIN ROTOR PITCH LINK (TWO REQUIRED)
4. SWASHPLATE ROTATING RING (TWO REQUIRED)

2. Decal, spot, color coding



DETAIL A

LOCATION: FORWARD AND AFT ENGINE FIREWALL

3. Decal, "B" nut warning placard shall be installed per T.B. 206-92-140

4. Decal, oil service

5. Decal, danger, right side (opposite), centerline of tailboom. Install per T.B. 206-85-114.

6. Decal, danger, left side (shown), centerline of tailboom. Install per T.B. 206-85-114.

206A/8S-M-11-1-2

Figure 11-1. Placards and markings (Sheet 2)

11-00-00
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BHT-206A/B-SERIES-MM-2

7. Decal, oil service

MAXIMUM ALLOWABLE BALLAST AFT 18 LBS

Helicopters S/N 4 thru 3906

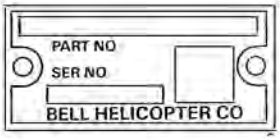
MAXIMUM ALLOWABLE BALLAST AFT 9 LBS

Helicopters S/N 3907 and subsequent

8. Decal, aft ballast

DO NOT USE FOR HANDLING HELICOPTER

9. Stencil, 047-761-024-1 (2 places)



10. A B Plate, serial and part number name

MAXIMUM ALLOWABLE WEIGHT 250 LBS
MAXIMUM ALLOWABLE WEIGHT PER SQ. FT. 86 LBS

11. Decal, maximum allowable weight (Located on the inside of baggage compartment door)

CARGO MUST BE SECURED IN ACCORDANCE WITH FLIGHT MANUAL INSTRUCTION

12. A B Stencil, cargo to be secured 206-070-619-101 (Located on inside of baggage compartment door)

NO STEP

13. Decal, no step

OPEN ↑
— LOCKED —

14. Decal, exterior door handle (206-070-611-3)

MAXIMUM ALLOWABLE BALLAST 20 POUNDS

Decal, 31-043-103 EJG

MAXIMUM ALLOWABLE BALLAST 30 POUNDS

Decal, 31-043-102 EJG

15. Ballast, forward

MAX. TURB.- 100%
MIN.TURB. - 97%
ABOVE 8000 FT

16. Decal, turbine limitations (206-070-624-3)

206A/BS-M-11-1-3

Figure 11-1. Placards and markings (Sheet 3)

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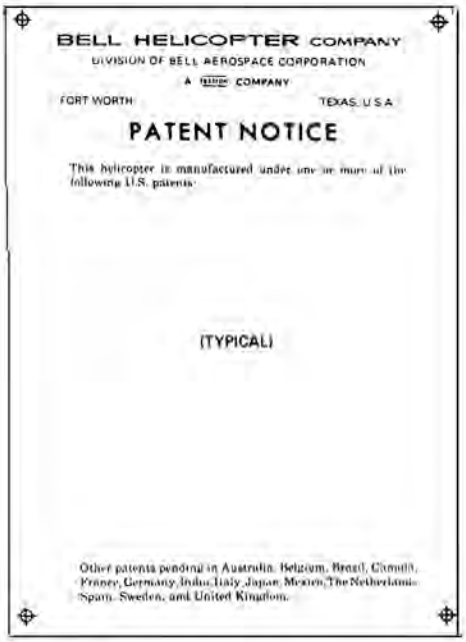
BHT-206A/B-SERIES-MM-2

20. Plate, helicopters 4122 and subsequent



21. A B Plate, identification — helicopter patent

MAXIMUM ALLOWABLE
BALLAST FWD 22 LBS

LOCATION: INSIDE BATTERY COMPARTMENT NEXT TO BALLAST PLATES

22. Decal, maximum ballast

CAUTION
DO NOT ADD WATER UNLESS BATTERY IS FULLY CHARGED
SEE MAINTENANCE MANUAL

LOCATION: B3 INSIDE BATTERY ACCESS DOOR NEAR HINGE AND IS TO BE READABLE WITH ACCESS DOOR OPEN.

23. Decal, battery maintenance

MAXIMUM ALLOWABLE
BALLAST FWD 28 LBS

24. Decal, ballast

206A/BS-M-11-1-7

Figure 11-1. Placards and markings (Sheet 7)

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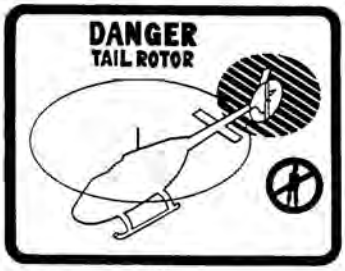

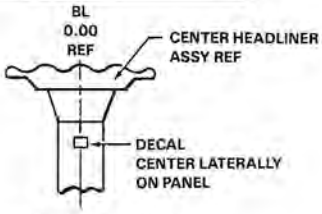

VIEW LOOKING FORWARD
PASSENGER COMPARTMENT
LOCATION

NOTES

Helicopters S/N 2212 thru 3906 shall have decal, danger installed per T.B. 206-85-114.

On Helicopters S/N 3907 and subsequent decal mounted as shown below.

25. Decal, danger tail rotor (Located passenger compartment)

SOFT GOODS ONLY

26. Decal, soft goods

SERVICE WITH MIL-L-7808
OIL OR MIL-L-23699 OIL
DO NOT MIX
SEE FLIGHT MANUAL

28. Decal oil service

B3 BELL JET Ranger III

27. Nameplate

FWD DOOR(S) OFF VNE 80 MPH
(69 KNOTS) C.G. 106-110

29. Decal, forward door(s)
(Located on both forward doorframe posts)

206A/BS-M-11-1-8

Figure 11-1. Placards and markings (Sheet 8)

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Activity 5-2 – Thinking Critically About Signs and Symbols

Figure 5-2 is an example of an emergency brochure that is similar to one that may be found in any helicopter. Using this brochure, answer the questions below:

1. Where is the fire extinguisher located?

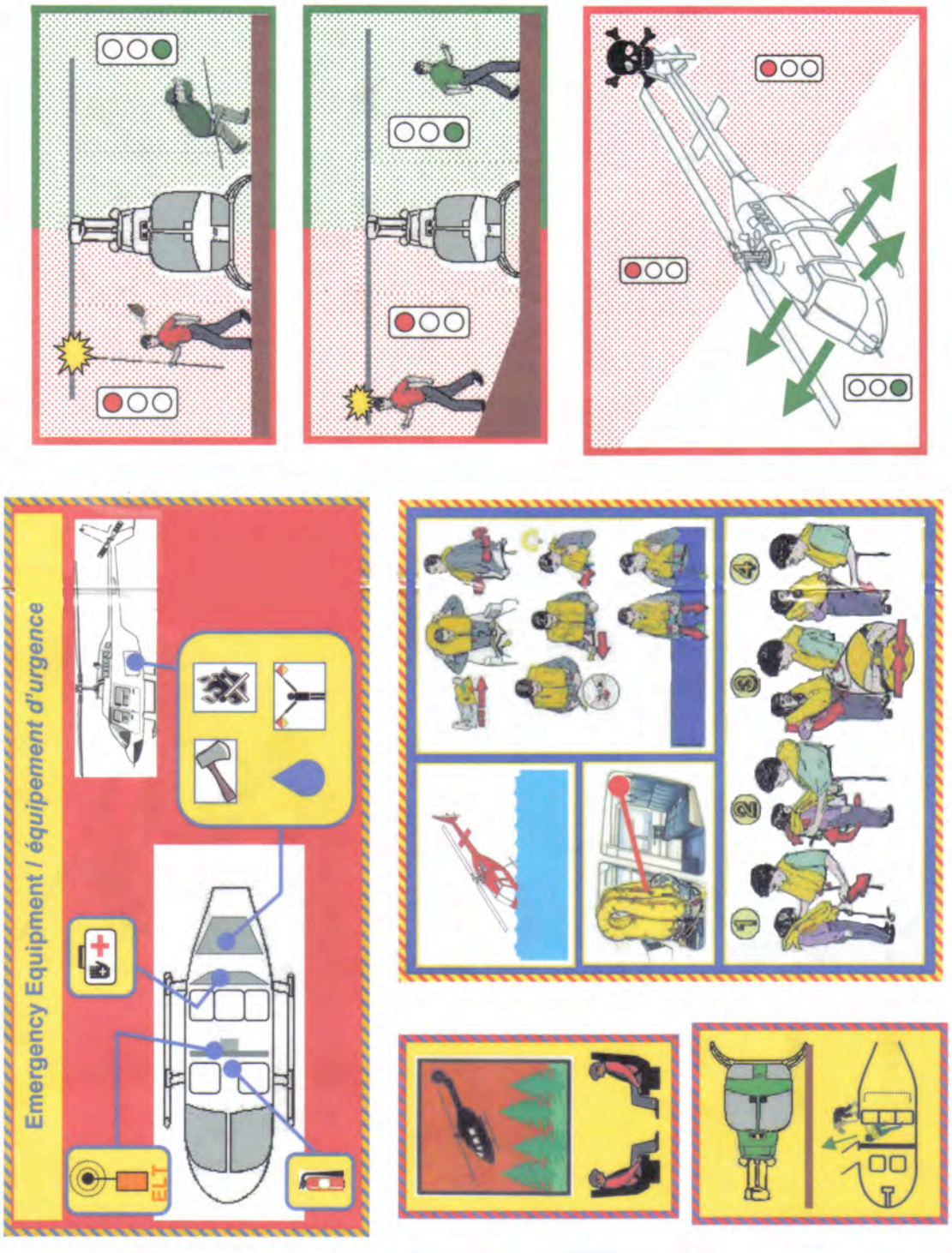
2. What is included in the survival kit?

3. What are 2 other items in the emergency equipment?

4. What visual symbols (graphics) are used on the right side of the brochure?

5. Explain another situation this brochure depicts.

Figure 5-2 – Emergency Brochure



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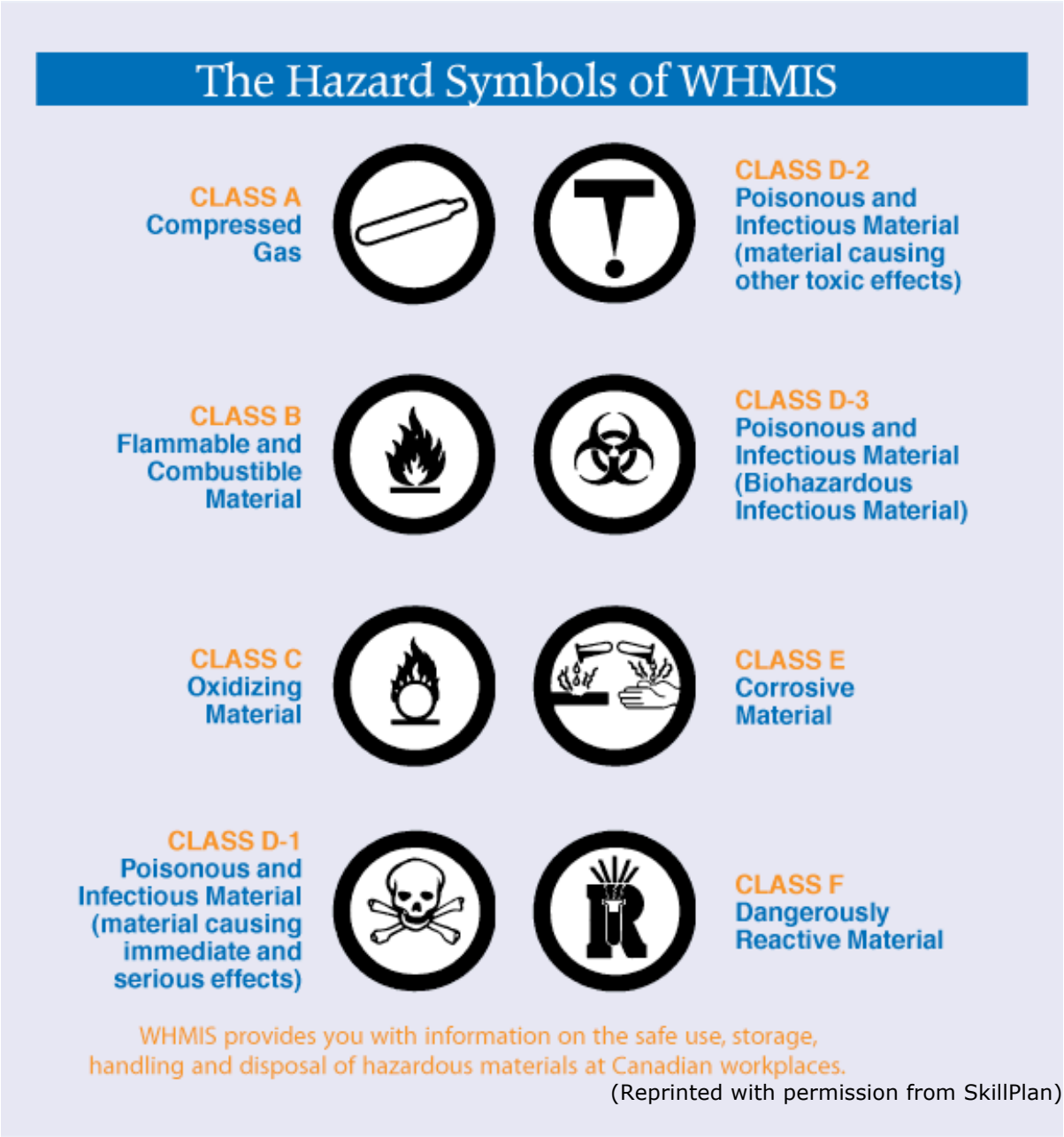
Signs, Symbols and Labels - Workplace Hazardous Materials Information System (WHMIS)

Signs, symbols and labels are used in the identification and handling of materials and dangerous goods. WHMIS is Canada's national hazard communication standard (Health Canada, http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/index-eng.php). WHMIS requires all workplace materials a) be classified as to their potential hazard; b) be labelled; and c) have an information sheet available (Material Safety Data Sheet (MSDS)). These symbols are accepted by all occupations. The following is a basic chart identifying WHMIS symbol language:

Figure 5-3 – WHMIS Symbols and Sample Label



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Labels

There are two (2) main kinds of WHMIS labels; **Supplier label**s and **Workplace labels**.

BOTH OF THESE TYPES OF LABELS MUST BE:

- Clear (legible)
- Easy to read
- Prominently displayed on the product

Supplier Labels

Every controlled product must have a complete supplier label. A supplier label has a distinctive "**slash-marked border**".

The seven (7) required pieces of information on a Supplier Label:

1. Products' name or identifier
2. Suppliers' name or identifier
3. Symbols or symbols for each of the classes, which apply to that product
4. Main hazards of the product
5. Precautions you should take
6. First-aid measures
7. A reference to the MSDS for more information

All supplier labels must be written in both English and French.

If the product is not properly labelled, it cannot be used. The product may be refused or it may be stored until an appropriate label can be obtained.

Figure 5-4 – Supplier Label

Workplace Labels

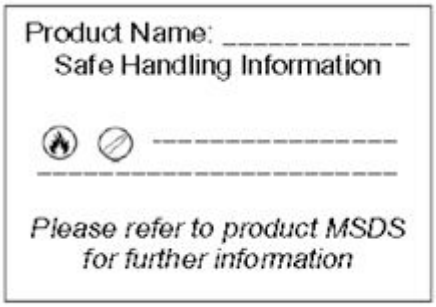
Just as the name suggests, workplace labels are applied at the workplace. They are used when a controlled product is transferred from a supplier's container or bulk storage container to workplace containers. These containers may also be referred to as secondary containers. Unlike the supplier labels, a workplace label is written in the language of the workplace.

Another use for workplace labels is to replace damaged supplier labels.

The three (3) required pieces of information on a Workplace Label:

1. Name of the product
2. Information on how to use the product safely (safe handling information)
3. Reference to the MSDS for further information

Figure 5-5 – Workplace Labels



PRODUCT IDENTIFICATION

SAFE HANDLING/ PERSONAL PROTECTION

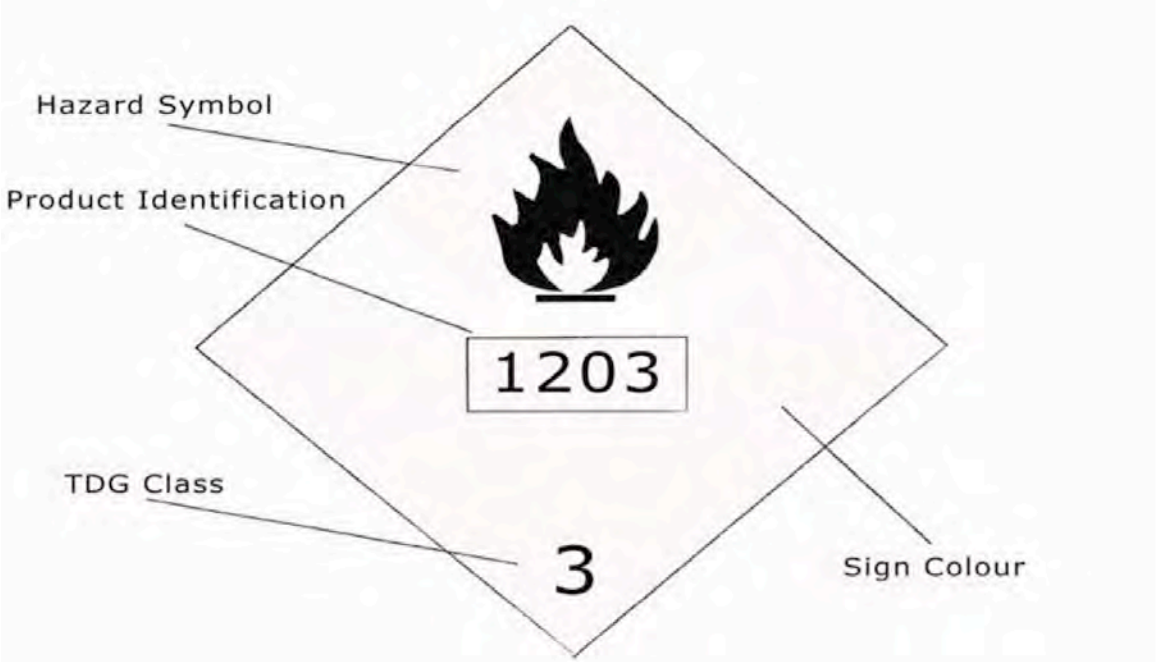
___Wear Protective Gloves
___Wear Respiratory Protection
___Wear Face/Eye Protection

Refer to Material Safety Data Sheet for additional information on this product

Transportation Labels

The Transportation of Dangerous Goods (TDG) program controls the shipment of dangerous goods and provides the information needed by emergency response personnel to deal with transportation accidents and spills. A system of diamond-shaped placards and labels is used to identify dangerous goods. Different colours and symbols depict the dangers peculiar to each regulated product. (Health Canada website, http://www.hc-sc.gc.ca/ewh-semt/occup-travail/whmis-simdut/transport-eng.php#a1)

Figure 5-6 – Transportation Label



Transportation of Dangerous Goods-Classes of Materials

TDG Class	Material	Sign Colour
Class 1	Explosives	Orange
Class 2	Compressed Gas	Red-Flammable Green-Non-poisonous
Class 3	Flammable Liquids	Red
Class 4	Flammable Solids	Red Blue-Reactive Solids
Class 5	Oxidizers	Yellow
Class 6	Poisonous Materials	White
Class 7	Radioative Materials	Red/Yellow
Class 8	Corrosive Materials	White
Class 9	Other Dangerous Products	White

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Material Safety Data Sheet (MSDS)

MSDSs contain more information and technical data than the supplier label or workplace label. It describes the product's properties, hazards, first aid measures and safe handling information.

There is no universal or standard format for MSDSs so the format and arrangement of the categories can differ from company to company. Even the headings may be different. However, information must be supplied in each of the categories for the MSDS to be considered complete.

WHMIS MSDSs have 9 (nine) categories of information

1. Product Information
2. Hazardous Ingredients
3. Physical Information
4. Fire and/or Explosion Hazard
5. Reactivity Information
6. Health Hazard Information
7. Preventative Measures
8. First Aid Measures
9. Preparation Information

It is up to you to make sure that you know where the MSDSs are kept at your workplace.

If you do not know, you need to ask someone (e.g., team leader, supervisor).

Activity 5-3 – Thinking About Hazard Symbols

All controlled products will have one or more **hazard symbols**. These symbols will allow you to identify the general hazards of the item at a glance. You will need to consult the supplier label or the MSDS for more detailed information. Using the information provided in Section 5 (including the Figures 5-3 to 5-6) please respond to the questions below:

1. What is the hazard implied by the label in Figure 5-3?

_____

2. There are seven (7) pieces of information that are required on supplier labels, list them.

a. _____ e. _____

b. _____ f. _____

c. _____ g. _____

d. _____

3. There are three (3) pieces of information that are required on workplace labels, list them.

a. _____ b. _____ c. _____

4. What are the nine (9) transportation of dangerous goods classes of materials?

a. _____ f. _____

b. _____ g. _____

c. _____ h. _____

d. _____ i. _____

e. _____

5. What are the nine (9) sign colours for the transportation of dangerous goods?

a. _____ f. _____

b. _____ g. _____

c. _____ h. _____

d. _____ i. _____

e. _____

6. What should you do if you cannot locate the MSDS in your workplace?

_____

Section Six: Interpret Information

Power Check

Graphs are a means of showing changes in one function in relationship to changes in another. They are used in aviation to determine the acceptable performance of systems or parts. Because aircraft are exposed to different air pressures (altitude changes) and temperatures, most charts relate to performance with respect to atmospheric conditions. These charts are used by engineers to determine if engines are performing to acceptable standards.

Example:

Using Figure 6-1 and 6-2, the "Performance" insert follow the example below:

1 – Begin with outside air temp 10 degrees (follow hashed/dotted line)

2 – Pilot applies power (pulls collective)

3 – Turbine outline temperature (TOT) reads 740 degrees

4 – Altitude reads 5000 feet

5 – Torque should read 93% ***or better*** (within engine specifications)

Activity 6-1 – Power Check

Using Figure 6-1 plot the following valves on the Power Check graph

- Temperature 12C
- TOT 760 degree
- Altitude 6,000 feet

1. What is the corresponding torque value?

_____

_____

2. Your aircraft C-GABZ showed 100% torque. With these values temperature, TOT and altitude, is the engine performing within acceptable limits? Explain.

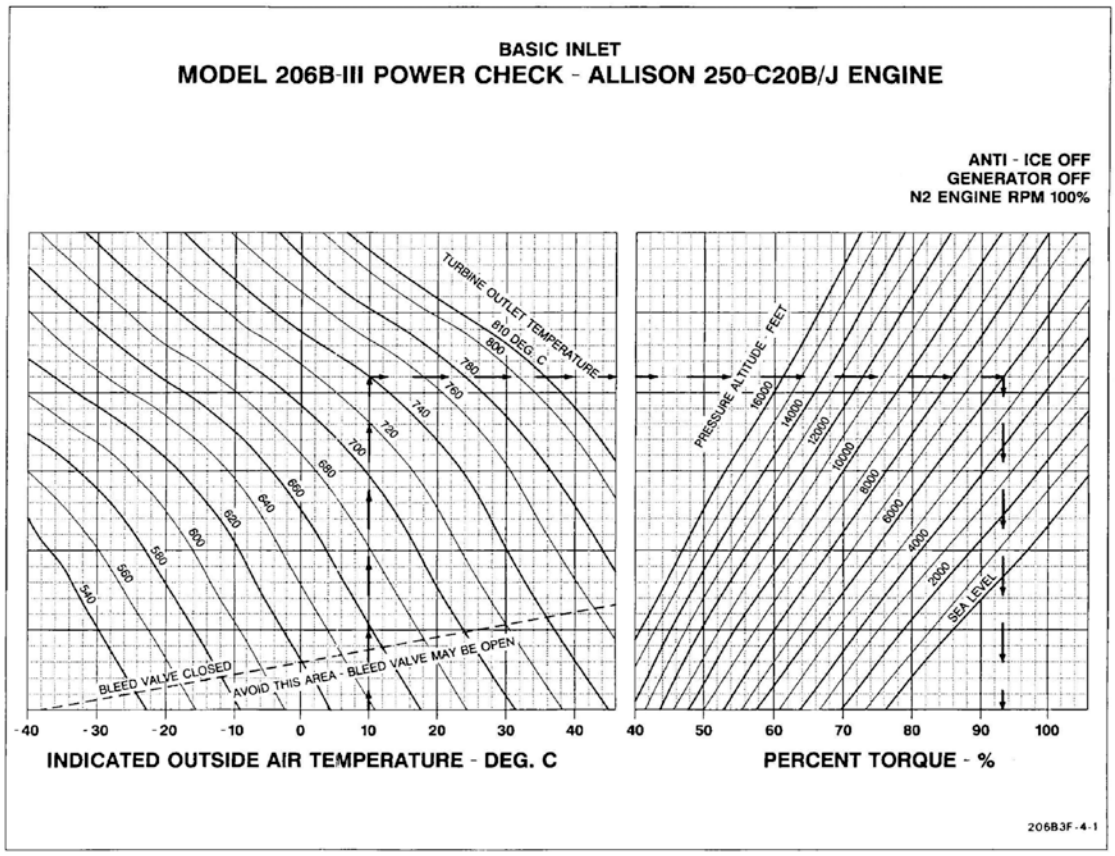
_____

_____

_____

Figure 6-1– Power Check Graph

BHT-206B3-FM-1 TC APPROVED



Power check chart Allison 250-C20B/C20J engine

4-4 Rev. 8 October 6, 2000

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Figure 6-2– Performance

Section 4

PERFORMANCE

The Bell 206B Jet Ranger III performance data are contained in this section. The data listed on the graphs are derived from actual flight tests and are intended to provide information to be used in conducting flight operations. The performance data contained herein is applicable to the 250-C20B/C20J engine.

POWER CHECK PROCEDURES

The Power Check chart indicates the minimum percent torque that must be available from an engine meeting the minimum Allison specification. The engine must develop these values in order to meet the performance data contained in this flight manual.

The takeoff power limits are as follows:

Maximum torque — 100% (5 minutes).

Maximum TOT (turbine outlet temperature) — 810°C (5 minutes).

Maximum gas producer RPM (N1) — 105%.

NOTE

Accurate power checks may be accomplished in a hover, in a stabilized 60 MPH (52 knots) IAS climb or in a level flight. Power checks should only be conducted in a hover when altitude, temperature, and gross weight permit safe hovering height. Refer to Height-Velocity Diagram in BHT-206B3-FM-1. More accurate checks are achieved above Maximum Continuous TOT (738° C), which will generally require being above 5,000 feet, to avoid exceeding torque limits.

On cold days, the torque pressure limit may be reached before the TOT limit is reached. On hot days and/or high altitudes, the TOT will be the limiting factor. To perform a power check, ensure the ENGINE DEICING or ENGINE ANTI-ICING switch and GEN switch are OFF. Raise collective to increase power until a stabilized TOT or torque pressure limit is reached. Record OAT, TOT, pressure altitude, torque and (N1). Refer to Power Check chart, figure 4-1.

EXAMPLE

OAT 10°C

TOT 740°C

PRESSURE ALTITUDE 6000 FEET

Actual percent torque (%) reading must equal or exceed chart percent torque (%) reading of 93.5% for power check to be acceptable.

RATE OF CLIMB

The rate of climb as measured with an altimeter will show rates of climb only on a standard day, with a standard temperature lapse rate. Refer to Rate of Climb charts, figure 4-2.

The following example is for use with Rate of Climb — Maximum with Takeoff Power. The example is typical for use with all Rate of Climb charts.