

TMO-6



FISHERIES TRAINING CENTRE

ENGINE KNOWLEDGE COURSE OUTLINE

REPUBLIC OF KIRIBATI



Control Number

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Contents

Introduction	3
Part A: Course Framework	4
Part B: Course Outline and Timetable	6
Part C: Detailed Teaching Syllabus	9
Part D: Instructor Manual	12
Part E: Evaluation	13

Introduction

This Course is designed to reflect the IMO developed model Course which was found very effective in meeting the requirements of the Convention and implementing the associated Conference and IMO Assembly resolutions.

Preferences were made by FTC Academic Board members after concurring that the IMO Model Courses were well arranged and very effective in assisting teaching staff in organizing, introducing and presenting their materials and in enhancing, updating or supplementing existing training materials where the quality and effectiveness of the training courses may thereby be improved. The Outline of this Course emulate the IMO Model Course, but with some modifications to adjust with facilities and resources available and national policies and to facilitate the FAO/ILO/IMO requirements for the Training and Certification of Fishing Vessel Personnel; Chapter 21, 23, 25, 27 and 31.

Instructors are expected to follow this guide bearing in mind that their knowledge, skills and dedications are the key components in the transfer of knowledge and skills to those being trained.

Timon Iokara
(Senior Instructor, Engine Department)
2012

Part A

Course Framework

▪ **Scope**

This course covers only the basic Engine knowledge.

▪ **Objective**

A trainee successfully completing this course will be able to know all safety rules in the Engine room, name and identify different types of tools and how to use them practically, but most importantly, an ability to assist in the Engine room and workshop in minor work where appropriate.

▪ **Entry standards**

This course is open to I-Kiribati citizens in the age range of eighteen to thirty years of age. Class Nine or Form Three Junior Secondary level is the minimum requirements and all candidates must be certified by a doctor to be in a good health and mentally fit. Elements of entry standard are detailed in the Intake Policy.

▪ **Course certificate**

Upon completion of the training, as approved by the Administration, a trainee who successfully completes it may be issued with a certificate, which has to be signed by the Principal and the Secretary for Ministry of Labour and Human Resource Development, the current governing body of the Institute.

▪ **Course intake limitations**

The number of trainee is demand driven depending on employer's demands. Trainees are to be sorted in classes with not more than twenty five trainees in a class. Practical trainings especially drills should involve all members of the class. The class may also be split into groups of not more than five trainees for group search, studies and projects.

▪ **Staff**

The Engine Department is headed by the Senior Instructor (Engine) holding a minimum qualification of Class V ticket. An assistant Instructor with long experience in the field is to assist the Head of Engine department in all task assigned respectively.

▪ **Teaching facilities and equipment**

Classroom facilities and an overhead projector are available for the theoretical part of the course. Video room is available at all times for audiovisual materials.

For the practical part of the course, a cut-out engine model is available and displayed to trainees to observe thoroughly how most moving parts work according to their theoretical knowledge. Beside that, a medium sized workshop with complete tool set is also available to facilitate scheduled practical sessions to familiarize them with all kinds of engine works.

▪ **Teaching aids (A)**

Instructor's Manual (Part D of the course) and Trainees Text Books are available.

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Audiovisual aids

The following are available;

- Elimination of unsafe act
- Potential hazards in a working process
- Personal protection equipment
- Diesel engine disassembling procedure
- Installation and adjustment of PSG woodward governor on S6A2 Diesel engine
- Standard Lathe work series 1,2,3,and 4
- Arc welding work series 1,2,3 and 4
- The correct use of measuring tools
- Engine re-assembly and adjustment
- Diesel engine adjusting procedure

▪ **References**

The following publications are made available for references to instructors and to enhance their knowledge:

Part B

Course Outline

Subject Area	Total Periods.	
	Lecture	Demonstrations
6.1 Tools and Workshop Safety	4	
6.2 Introduction to Engines .1 Outline of motive power .2 Classification of Motors .3 Heat Engines .4 Internal combustion engine	4	
6.3 Outline of the Diesel Engines .1 Piston Engine principles .2 2-cycle Engines and 4-cycle Engines .3 Spark ignition engines and compression ignition engines .4 Outline of compression ignition	3	2
6.4 4-cycle Diesel engine .1 Intake stroke .2 Compression stroke .3 Expansion stroke .4 Exhaust stroke	3	1
6.5 2-cycle Diesel engine .1 Intake & Exhaust .2 Compression & Expansion	3	1

6.6	Parts of Engine		
	.1 Cylinder head		
	.2 Valves		
	.3 Valve drive system		
	.4 Cam shaft		
	.5 Piston		
	.6 Piston rings		
	.7 Gudgeon Pin		
	.8 Blocks and liner		
	.9 Connecting Rod		
	.10 Crank shaft		
	.11 Bearings and Gears		
		11	1
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6.7	Lubrication System		
	.1 Type of Lub Oils.		
	.2 Lubrication principles		
		3	1
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6.8	Fuel System		
	.1 Types of Fuels		
	.2 Purification of fuels		
	.3 Fuel Pump		
	.4 Fuel Injection		
		3	1
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6.9	Cooling System		
	.1 Principles of cooling		
	.2 Type of cooling system		
		3	1
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6.10	Propeller		
	.1 Types of propellers		
	.2 Propeller Shaft		
	.3 Stern tube and frames		
		3	1

6.11 Refrigerating		
.1 Principles of refrigeration		
.2 Types of refrigerant		
.3 Hazards associated with refrigerant		
	3	1

6.12 Battery (Lead Acid battery)		
.1 Safety precautions when working with batteries		
.2 Maintenance and care of Batteries		
.3 Parallel & Series connections		
	7	1

6.13 Gauges		
.1 Types of gauges		
.2 Purpose of different gauges		
	2	1

Total	64	
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Engine Knowledge Course Timetable

Duration of the Course is Twelve Months of which sixteen weeks covers the Junior Stage and nineteen weeks for Senior Stage. Time Tables covering all aspect of FTC modules, including practical onboard trainings, are incorporated in the Time Table (programmed) to cover all sections of different modules throughout the thirty five weeks of the Course.

Part C Detailed Teaching Syllabus

The detailed teaching syllabus has been written in learning objective format in which the objective describes what the trainee must do to demonstrate that knowledge has been transferred.

Instructors are encouraged to follow the Engine knowledge Teacher's Guide to deliver the lesson effectively and to apply activities which will develop trainee's knowledge.

The list below provides references and Text Books for Instructors to easily relate what is being taught and to expand their knowledge, especially when preparing their lesson plan.

	<u>Learning Objectives</u>	IMO Reference	Textbooks Bibliography	Teaching Aid
6.1	Knowledge for safety in the engine room and workshop and ability to identify tools with their usage	Appendix 21, 23, 25, 27 and 31 of the Document for Guidance on Training and Certification of Fishing Vessel Personnel.	FTC Engine textbook	
6.2	Candidates are to appreciate the importance of motive power. A short history of engines and engine eras		FTC Engine textbook	
6.3	Appreciate of engine principles, cycles and the differences of compression and sparks ignition engines.		FTC Engine textbook	
6.4	Trainees to fully understand a different operations of the stroke		FTC Engine textbook	
6.5	Knowledge of a 2-cycle engine and how it works.		FTC Engine textbook	
6.6	The trainees will learn the importance of Engine parts like cylinder head, valve, valve drive system, camshaft. Piston and piston rings, gudgeon pin, blocks and liner, connecting rod, crankshaft and bearings and gears and their functions.		FTC Engine textbook	
6.7	The candidate will appreciate the lubrication system and diagram.		FTC Engine textbook	

	<u>Learning Objectives</u>	IMO Reference	Textbooks Bibliography	Teaching Aid
6.8	Trainees will know the importance of fuel system and diagram	Appendix 21, 23, 25, 27 and 31 of the Document for Guidance on Training and Certification of Fishing Vessel Personnel.	FTC Engine textbook	
6.9	Trainees will know the importance of cooling system and diagram		FTC Engine textbook	
6.10	Trainees will know the definition of a propeller, and the connection of different parts related to the propeller		FTC Engine textbook	
6.11	Basic theoretical knowledge of refrigerating system		FTC Engine textbook	
6.12	Candidate will have a knowledge on battery and how it works		FTC Engine textbook	
6.13	Knowledge on different types of gauges and their usage in engine.		FTC Engine textbook	

Part D

Instructor Manual

▪ Introduction

The instructor manual provides guidance on the material that is to be presented during the course. The course material reflects the requirements for the certification before engaged in employment, particularly on Japanese fishing vessels.

The material has been arranged under thirteen main headings:

- 1) **Tools and workshop safety**
- 2) **Introduction to Engines**
- 3) **Outline of diesel engines**
- 4) **4-cycle diesel engine**
- 5) **2-cycle diesel**
- 6) **Parts of engines**
- 7) **Lubrication system**
- 8) **Fuel sysem**
- 9) **Cooling system**
- 10) **Propeller**
- 11) **Refrigerating**
- 12) **Battery**
- 13) **Gauges**

The course outline and timetable provide guidance on the time allocation for the course material, but the instructor is free to make adjustments as necessary. The detailed teaching syllabus must be studied carefully and lesson plans or lecture notes compiled where appropriate.

It will be necessary to prepare material for use with overhead projectors or for distribution to trainees as handouts. Preparation is essential if the course is to be effective and successful.

Evaluation covers practical exercises and theoretical knowledge. Guidance on evaluation of the theoretical part of the course is given in Part E of the course.

Throughout the course it is important to stress that rules and regulations must be strictly observed and all precautions taken to maximize safety with minimum effect on the environment. Where appropriate, trainees should be given advice on the avoidance of accidents.

Part E

Evaluation

▪ Introduction

The effectiveness of any evaluation depends upon the accuracy of the description of what is to be measured.

The learning objectives used in the detailed syllabus will provide a sound base for the construction of suitable tests for evaluating trainee progress.

▪ Method of evaluation

Having a defined objective as detailed in Learning Objectives the following Evaluation methods are to be conducted:

- Unit Tests &
- End of Stage Exam
- Course End Result

Unit Tests

At the end of every topic, trainees are to be given a written and/or practical test to ascertain how much the trainees had absorbed. Trainees failing the unit test are to be given extra study hours under close guidance of the topic instructor in accordance with FTC Rules for trainees and the Quality Management System. Re-testing of these trainees will be conducted after a considerable time of extra study hours given and the instructors satisfies that they are ready. A test at the end of the topic is also a self evaluation process of instructors.

End of Stage Exam

Before the end of each stage, Junior & Senior Stage, trainees are to be given two weeks revision in preparation before the Final Exams in accordance to the Quality Management System.

Junior Stage Exam covers all the topics taught from the beginning to the end of the Junior Stage. Exams are in the form of Written and Practical Demonstrations. Senior Stage Exam comprises with Written, Practical and Orals. Trainees could be assessed/evaluated in a group for practical exams.

▪ **Scoring**

Scoring of written Papers are by marks awarded for each question while practical exams are awarded with either a straight Pass or FAIL.

Written Papers comprises with a combination of:

- Short Answers
- Long Answers
- True or False &
- Multiple Choice questions.

Questions, particularly long answer questions are to be weighed to reflect the relative importance of questions or of sections of an evaluation.

The table below represents a guideline to the scoring of any assessment in all modules.

%*	meaning	grade	result
95 to 100	excellent	1	pass
80 to 94	very good	2	pass
65 to 79	good	3	pass
50 to 64	satisfactory	4	pass
less than 50	poor	5	fail