

## Daily Outline

### **Day One**

#### Morning Session:

Introduction to the basic theories of engine operation. The two-stroke and four stroke engine cycles will be explained in detail, with a discussion of the advantages and disadvantages to each. A comparison of these cycles between gasoline and diesel engines will follow.

A discussion of marine conversions of automotive / industrial engines for marine use shall follow. We'll look at the essential differences and how manufacturers turn these engines into "marine" units.

Afternoon Session: The needs of an engine. Fuel, air, exhaust, all at the right time and in the correct quantities. As regards engines, these are the basic needs. This is the essence of engine troubleshooting. We'll discuss these needs for both gas and diesel fueled engines and begin analyzing symptom sets when these needs are not met. This focused look at classic symptoms of engine problems and possible solutions is where the novice diagnostician will begin to connect engine theory of operation and basic needs into a fault/solution format. We'll continue with a look at the various tools and methods used to confirm or deny certain key faults such as low compression. Fuel and exhaust problems, or in the case of gasoline fueled engines, ignition system failures.

### **Day Two**

#### Morning Session

A continued look at diagnostic methods for troubleshooting both gas and diesel fueled engines. Students will help develop a generic troubleshooting checklist for both gas and diesel engines based on a discussion of the classic symptoms such as rough running, power loss, overheating, excessive smoke, and no-run conditions.

#### Afternoon Session

Introduction into fuel injection systems. We'll begin with a look at gasoline fuel injection systems popular on today's engines. Classroom discussion will focus on how these systems meet the needs of an engine better than their carbureted counterparts. We'll then focus on the proprietary aspects of these engines and the specialized troubleshooting techniques necessary to determine system component integrity. We'll move on to diesel fuel injection system troubleshooting techniques, with emphasis on the mechanically based systems still prevalent on smaller primary and auxiliary diesel propulsion, as well as AC generator diesel engines. Next, we'll take a look at some of the electronic diesel fuel injection systems available and compare and contrast them to the traditional mechanical systems.

### **Day Three**

#### Morning Session

A continuation of the diesel fuel injection system discussion covering cylinder isolation, injector testing confirmation of correct injection pump timing and isolation of problems to the injector pump. We'll also discuss diesel fuel problems and how to confirm such things as system contamination, fuel dilution, and approximate cetane level.

#### Afternoon Session

Basic drive systems, inboard and IO drive basics will be discussed. Operating principles and key components will be identified. Service requirements will be highlighted in this section.

Next, we'll move on to basic engine maintenance, commissioning and decommissioning procedures will be discussed at length.

Finally, there will be a 30-question quiz at the end of the day to help the student evaluate their own grasp of the material presented over the three day program. The question style will be modeled after the ABYC Engine Certification Exam questions and this quiz is intended to give the student a feel for their own progress toward Certification.