Practical Exercise for Instruction Pack 3

Contents

Practical Exercise for Instruction Pack 3

INTRODUCTION

The purpose of this practical exercise is to help you apply your knowledge of motorcycle and ATV engine operation to some real-life examples. In this exercise, you'll become even more familiar with lubrication, cooling, and fuel systems as well as clutches, transmissions, and drives. You'll also learn some things that weren't contained in the study units.

At the beginning of this practical exercise are eight Suggested Activities. As in the practical exercise that you did previously, you'll have a chance to get out and have some fun while you continue to learn by applying the knowledge you've gained thus far. Note that these activities are optional and aren't required to complete the program. However, accomplishing the activities can help you gain a better understanding of the study unit material. We strongly recommend that you attempt to complete as many of the activities as possible.

If you wish to review the text material that covers the topics contained in this practical exercise, you can refer back to the following study units:

- *Lubrication and Cooling Systems*
- *Fuel Systems*
- *Clutches, Transmissions, and Drives*

When you've finished with the suggested activities, complete the examination at the end of the exercise. The examination is required and must be submitted to the school for grading.

Remember, even though this exercise contains examination questions, we've designed it to be fun! Applying your knowledge will help you to realize just how much you've really learned about how the engines used in motorcycles and ATVs operate.

SUGGESTED ACTIVITIES

It's time to get out and have some fun. The following pages contain some activities that relate to lubrication, cooling, fuel, clutches, drives, and transmissions used for and in motorcycles and ATVs that you've been learning about. Try these activities to expand your knowledge and improve your understanding of the written material contained in the study units. Remember, none of these suggested activities are required to complete the program and none of them will be graded.

These activities are designed to help you to apply your motorcycle and ATV engine operation knowledge. At any time, you can proceed to the graded portion of the practical exercise that begins on page 9.

Activity 1

Visit the oils and lubricants section of a local motorcycle dealership. Observe the different brands and types of oils and lubricants, then answer the following questions. It may help to take your *Lubrication and Cooling Systems* study unit with you for reference.

Question: What manufacturers' oils are represented in the store? Use the chart to indicate the oil's base (petroleum, synthetic, or blend), API classification (SA, SB, SC, SD, SE, SF, SG, SH, or SJ), and SAE viscosity rating (for example, 10W40). Record your findings below.

Print

Types of Oils			
Oil Manufacturer	**Base**	**Classification**	**Viscosity**

Question: Compare the cost of petroleum-based oils to synthetic-based oils. Which one costs more? Now, considering that synthetic oil allows for longer engine running time before an oil change is needed, calculate the cost of the synthetic oil over a one-year period compared to the cost of the petroleum-based oil. Which oil is the best price-performer?

Question: What special additives can you find listed in various oils? What protection does each additive provide? Record your findings below.

Print

Protective Properties of Oil Additives	
Additive	**Protection Provided**

Print

Question: What other kinds of specialty lubrication products are available? For what purpose are they used? Record your findings below.

Purposes of Specialty Lubricants	
Specialty Lubricant	**Product Purpose**

Activity 2

Perform the following experiment to demonstrate the properties of detergent oil. To prepare for the experiment, purchase two quarts of oil at a motorcycle, ATV, or auto parts store. One quart should be a detergent type; the second quart should be a non-detergent type. At home, find two small, empty glass jars with lids. (Empty baby food jars work well.) Fill one jar with detergent oil (about ¾ full). Fill the other jar with non-detergent oil. Add an equal pinch of ordinary dirt to each jar. Shake up the jars, then let them sit undisturbed for about two days. Observe the jars and record your observations.

You probably noticed that the jar with the detergent oil suspends the dirt, or lets it float to the top. The non-detergent oil allows the dirt to settle toward the bottom of the jar. When you're finished, dispose of the oil properly and don't attempt to reuse the containers from the experiment!

Activity 3

Purchase or borrow a coolant tester so you can test the antifreeze and antiboil properties of a coolant. Coolant testers, also called hydrometers, are inexpensive measuring instruments that can be purchased at any auto parts store. Notice that the coolant tester has a hose or tube at the bottom and a rubber bulb at the top. To use the device, insert the hose or tube into the fill opening of a radiator. Squeeze the bulb, then release it to draw fluid into the tester. The pointer needle inside the tester will rise and point to a number on the temperature-protection gauge.

Some testers have two gauges. The antifreeze gauge is printed on the front of the tester; the antiboil gauge is printed on the back. As the pointer needle moves along the scale, it actually points to both an antifreeze number (on the front of the tester) and an antiboil number (on the back of the tester). Numbers indicate the temperature to which the coolant sample protects. Consider this example. Suppose you drew a fluid sample from an engine's radiator into the tester. You noted that the needle pointed to 120° F on the antifreeze gauge and to 262°F on the antiboil gauge. What does this mean? It means that the fluid sample you drew from the radiator would be protected from freezing down to 120° F, and from boiling up to 262° F.

Why does the pointer needle rise when you draw a fluid sample into the tester? The reason is that adding coolant to water makes a mixture that's denser than the water alone. So, the more coolant that's in the fluid, the more dense the fluid will be, and the higher the needle will rise in the tester. The result of the coolant test tells you whether coolant needs to be added to the fluid in the cooling system. The more coolant that's in the fluid sample, the greater the protection for the cooling system. Remember, you should never mix coolant and water in a greater than 50/50 ratio.

Try some additional coolant tests by mixing a solution of water and coolant in an old pot or coffee can and drawing the mixture out of the container. Test a mixture that contains 3 parts water to 1 part coolant. Next, try a half-water, half-coolant mix.

Activity 4

Purchase or borrow a thermostat so you can experiment with and observe its operation. Thermostats are very inexpensive and can be purchased at any auto parts store. Recall that a thermostat is a small device used in liquid-cooled engines to regulate the temperature of the coolant that flows through the engine. Most thermostats contain a small pellet of wax inside a housing. The housing is exposed to the coolant and expands as the coolant gets hotter. The expansion of the wax moves a tiny diaphragm and piston assembly, which in turn opens a valve and allows coolant to flow through the open thermostat.

Notice the thermostat's temperature rating. This information should be provided in the packaging. Common temperature ratings range from 175°F to 200°F. When the temperature of the coolant in an engine reaches the thermostat's temperature rating, the thermostat opens. In this activity, you can test the thermostat to see if it actually opens at the stated temperature rating.

With this experiment, you'll watch the thermostat open and close by submerging it in hot water. Fill a pot half-full with water and heat it over a burner. You can safely heat the water on an indoor stove, if you wish, as this activity doesn't involve any toxic liquids or hazardous materials. Don't use the same pot you used to heat the coolant in the previous exercise. If you have a cooking thermometer, use it to measure the temperature of the water. When the water reaches a temperature that's about 10°F less than the thermostat rating, lower the thermostat into the water. To do this, bend a length of wire into a hook and hang the thermostat from the end. Hold the other end of the wire in your hand. (Be sure to use an oven mitt or towel to protect your hand from the heat.) As an alternative, you can suspend the wire from a small wooden rod placed across the top of the pot. Don't allow the thermostat to touch the bottom of the pot, as the metal bottom will be hotter than the water in the pot. Now, watch the thermostat in the water carefully to see when it opens. When it opens, look at the thermometer. The temperature reading on the thermometer should match the thermostat's rating. Remove the pot of water with the thermostat from the burner. Add a bit of cool water to the pot, then watch the thermostat to see it close up again.

Activity 5

In this activity, you'll observe the operation of a pressure tester. A pressure tester is a device that's used to test for coolant leaks in radiators and radiator caps. The pressure tester is a somewhat more expensive tool than the devices used in the previous activities. If you wish to purchase one, you'll probably use it often in your repair activities. If you don't want to purchase a tester at this time, you may be able to borrow one from a local mechanic, or rent one from an auto parts store or supplier. If you don't have an available motorcycle or ATV (with a radiator) to test, you can practice using any available automobile radiator or radiator cap.

A typical pressure tester has a small hand pump, a pressure gauge, and adapters that fit onto either the radiator or the radiator cap. To test a radiator for leaks, remove the cap from the radiator, then attach the tester's adapter to the open filler hole. Make sure the radiator is cool and the engine is turned off before you perform this test.

Now, pump up the pressure tester, using the hand pump, to the rated pressure of the engine's radiator. The radiator's correct rated pressure is given in the service manual. The rated value is usually between 7 pounds per square inch (psi) and 17 psi. After the tester is pumped up to the proper pressure level, watch the gauge for about two minutes. If the pressure drops more than 2 psi in those 2 minutes, check the radiator for leaks. Keep up the pressure in the tester while you visually examine the hose ends, water pump gasket or shaft, cylinder head gasket, and radiator surfaces for coolant leaks.

You can also test the radiator cap for leaks. Remove the radiator adapter from the tool and attach the radiator cap to the end of the pressure tester, using the necessary adapter. If the cap is dirty, clean it first. Pump up the tester to the rated pressure of the cap. Then watch the pressure gauge for about two minutes. If the cap fails to hold its rated pressure, it should be replaced. The tester can also be pumped past the rated pressure of the cap to see if it releases pressure when the rating is exceeded.

Activity 6

Stop by your local motorcycle or ATV dealership. Walk around and look at the different types of machines. While looking at the products, try to identify the type of carburetor that's used on each machine. The carburetor will be easily visible on most ATVs. On many motorcycles, however, the carburetor will be covered by a fairing or other accessories. Use the space below to record the types of carburetor used on each motorcycle and ATV you see.

Print

ATV Model	Type of Carburetor
Motorcycle Model	**Type of Carburetor**

Activity 7

Refer to your collection of manufacturers' service repair manuals, owner's manuals, and sales brochures that you collected during the Activity Phase of Module 1. Choose several different motorcycles or ATVs from the material and see if you can find the type of design used for the

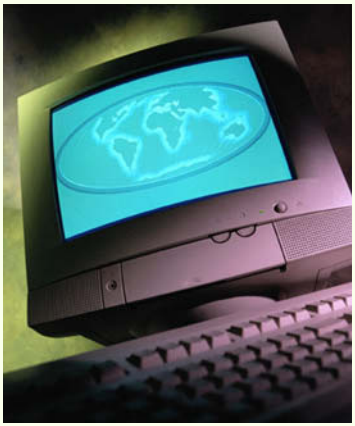
- Gears
- Primary drive
- Clutch system
- Transmission
- Final drive

Activity 8

Using the results from Activity 7, compare the differences between the motorcycles or ATVs. Explain below the reasons why different designs were used.

Conclusion

We hope you've enjoyed the practical exercises. When you're ready, proceed to the graded portion of the practical exercise. This part of the exercise is completed in the same way as the other examinations for your program. Follow the instructions provided to send your answers in to the school for grading.



ONLINE EXAMINATION

For the online exam, you must use this

EXAMINATION NUMBER:

03382401

When you're confident that you've mastered the material in your studies, you can complete your examination online. Follow these instructions:

1. Write down the eight-digit examination number shown in the box above.
2. Click the **Back** button on your browser.
3. Click the **Take an Exam** button near the top of the screen.
4. Type in the eight-digit examination number.