

Bruner's E2: Exploration Lens

Process	4C Super Skill	Engine Management System Activity
<p>2-1. Plug the single-phase 2P 240V power cord and apply to the normal power line DC 12V, which is rectified through direct-current power supply.</p> <p>2-2. Turn on the key switch, after turning on the emergency stop switch to clockwise direction, to activate the ECU, sensors, and actuator.</p> <p>2-3. Verify the sensor value change, trouble code, and system operation change (ignition time and fuel injection amount), when the injector is operated and a spark is formed at the ignition plug with adjustment of variable output control knob of TPS Vol.</p> <p>[Reference] - TPS Knob should be positioned at "0". (end to counterclockwise direction) - When TPS Vol. is turned to clockwise direction, the acceleration speed of intake/exhaust air is increased, and the injector and ignition plug, operation is changed.</p>	Communicating	<p>Discuss the relationships among electrical components in the engine management system and how they contribute to vehicle performance. Probe for deeper understanding by discussing the function of each component and its role in optimizing engine operation.</p> <p>Conduct whole-class discussions on controversial topics related to automotive technology, such as the impact of engine tuning on emissions or fuel efficiency. Discuss misconceptions and correct them through collaborative exploration of engine management concepts</p>
	Collaborating	<p>Work in teams to study the engine management system, dividing tasks such as researching sensor functions, ECU programming, and troubleshooting procedures. Use the Internet to form peer learning networks and share resources for understanding complex engine systems.</p> <p>Collaborate on assessment tasks with students from different countries, connected via the Internet, to analyse engine performance data and propose solutions for improving fuel efficiency or reducing emissions.</p>
	Critical Thinking and Problem Solving	<p>Venture into new areas of research by exploring advanced engine tuning techniques and their effects on performance. Conduct experiments to discover optimal sensor configurations for different driving conditions and analyse data to draw conclusions.</p> <p>Use internet resources to explore the life cycle of engine components and conduct studies on the environmental impact of different engine management strategies. Engage in virtual excursions to automotive laboratories or factories</p>

		to observe engine manufacturing processes.
	Creating and Innovating	<p>Reflect on engine management concepts and propose innovative ideas for optimizing performance or addressing environmental concerns.</p> <p>Use new URLs and digital resources to find learning materials and integrate them into class activities. Download useful resources from platforms like YouTube to learn about engine tuning techniques or innovative engine designs, then use this knowledge to design simulations that encourage critical thinking and experimentation with engine management systems.</p>

Bruner's E2: Exploration Lens

Process	4C Super Skill	Engine Management System Activity
<p>2-4. Verify the output value change, trouble code output, and system operation change (ignition time and fuel injection amount), using variable control knob of TPS, ATS, WTS, MAP and O2.</p> <p>[Reference] How to set up – The trouble code is produced and the warning lamp lights up when the setting is inadequate.</p>	Communicating	<p>Talk about the relationships among engine management concepts and components, discussing how adjustments to TPS, ATS, WTS, MAP, and O2 affect system operation. Discuss and correct any misconceptions about engine tuning and diagnostic procedures.</p> <p>Probe for deeper understanding of engine management by conducting whole-class discussions on controversial topics such as the trade-offs between performance and emissions control in engine tuning. Watch video clips demonstrating engine diagnostic procedures and discuss their messages.</p>
	Collaborating	<p>Work in teams to study engine management systems, dividing tasks such as researching the functions of TPS, ATS, WTS, MAP, and O2 sensors, and their effects on engine performance. Use the Internet to form peer learning networks and share findings about engine diagnostics and tuning.</p> <p>Collaborate with classmates to monitor and scaffold each other's learning, providing support and assistance as needed to understand complex engine management concepts. Use virtual learning communities to share resources and discuss engine tuning strategies with peers worldwide.</p>
	Critical Thinking and Problem Solving	<p>Venture into new areas of research by attempting new experiments to discover how adjustments to TPS, ATS, WTS, MAP, and O2 affect engine performance. Conduct internet searches to explore the life cycle of engine components and their impact on diagnostic procedures and tuning strategies.</p> <p>Analyse data from engine management systems to explore patterns and relationships, such as how changes in sensor values affect ignition timing and</p>

		fuel injection amounts. Conduct studies of engine performance on virtual excursions or field trips to automotive laboratories or workshops.
	Creating and Innovating	Reflect on engine management concepts and come up with new ideas for optimizing engine performance or diagnosing engine issues. Use new URLs to find learning resources and incorporate them into class activities on engine diagnostics and tuning. Download useful resources from platforms like YouTube and use them to design new diagnostic procedures or tuning strategies. Create a curriculum-specific simulation that challenges peers to practice critical thinking and problem-solving skills in engine management.

Bruner's E2: Exploration Lens

Process	4C Super Skill	Engine Management System Activity
2-5. When the equipment stops, set the TPS knob at the default position and turn the ignition key off.	Communicating	<p>Discuss the relationship between setting the TPS knob at the default position and the engine shutdown process. Address any misconceptions about why this step is necessary and clarify its importance in maintaining engine health and safety. Engage in whole-class discussions to explore different perspectives on the significance of proper shutdown procedures. Discuss the implications of improper TPS knob adjustment.</p> <p>Watch video clips demonstrating engine shutdown procedures and discuss the messages they convey about the importance of correct TPS knob settings. Explore internet resources to understand the safe use of engine control systems and how they contribute to vehicle reliability and performance.</p>
	Collaborating	<p>Work collaboratively in teams to study the engine management system and understand the role of the TPS knob in the shutdown process. Monitor and scaffold each other's learning by sharing insights and assisting team members in comprehending technical concepts. Form peer learning networks to exchange information and support related to engine shutdown procedures.</p> <p>Utilize virtual learning communities through platforms like Google Circles to collaborate with classmates on engine management topics. Complete assessment tasks with students from different countries, connected online, to compare and evaluate engine shutdown protocols globally. Collaborate as a team to conduct experiments simulating engine shutdown scenarios and analyze the outcomes.</p>

	Critical Thinking and Problem Solving	<p>Venture into new areas of research to understand the implications of improper TPS knob adjustment during engine shutdown. Reflect on the consequences of incorrect procedures and engage in metacognitive processes to evaluate the effectiveness of different shutdown protocols. Conduct internet searches to gather data on engine shutdown procedures and analyze their impact on engine performance.</p> <p>Conduct studies or virtual excursions to explore real-world scenarios where engine shutdown procedures are critical for vehicle safety and reliability. Analyze data from nature strips or study fields to draw parallels with the importance of proper TPS knob settings in maintaining engine health and operational efficiency.</p>
	Creating and Innovating	<p>Reflect on the engine shutdown process and brainstorm new ideas for optimizing TPS knob settings. Encourage students to propose innovative approaches to engine shutdown procedures and challenge conventional methods. Use online resources to find new learning materials and integrate them into class activities to enhance understanding of engine management systems.</p> <p>Download useful resources from platforms like YouTube to design interactive simulations or demonstrations illustrating the consequences of incorrect TPS knob adjustment during engine shutdown. Encourage students to create curriculum-specific simulations that promote critical thinking about engine management practices and emphasize the importance of proper TPS knob settings.</p>