

## **Basic Mobile Electronics Installer 12**

**District Name:** Abbotsford – School District 34

**District Number:** School District 34

**Developed by:** Cory Wong

**Date Developed:** September 2008

**School Name:** W. J. Mouat Secondary School

**Principal's Name:** Rob Comeau

**Board/Authority Approval Date:**

**Board/Authority Signature:**

**Course Name:** Basic Mobile Electronics Installer

**Grade Level of Course:** 12

**Number of Credits:** 4

**Number of Hours of Instruction:** 120

**Prerequisite(s):** None

**Special Training, Facilities or Equipment Required:**

Access to a computer lab equipped with internet access is needed for online testing and tutorials. The teacher must have an extensive knowledge in the automotive repair industry, knowledge of basic automotive electronics, body work and installation of automotive components. The teacher should have a basic understanding for automotive audio components and have close ties to suppliers, places of work and related businesses. Teacher certification is available through Marcrafft educational technologies and is a prerequisite for teaching this course. The classroom should be equipped with or have access to equipment found in a car audio installation facility. Students will need access to a vehicle training aid which can be purchased from Marcrafft educational technologies. The shop should be set-up as such to include areas for theory instruction and hands on instruction.

**Course Synopsis:**

The Basic Mobile Electronics Installers course teaches students the basic skills to work as a certified car stereo installer. They will obtain a certificate that is recognized by the industry as a standard for basic training. This certificate is issued by the Consumer Electronics Association in partnership with Marcrafft Educational Technologies. Upon successful completion of the course and the certification, students can begin work as a stereo technician at places such as Best Buy or Future Shop. The theory component is organized into modules and requires 90% mastery of concepts before proceeding onto the next unit. This is administered by a computer generated online test. Practical skill mastery is organized into 38 hands on labs. They will learn: basic electrical theory, installation & shop safety, and mobile electronic components. Students will be able to practice their skills with various lab exercises.

**Rationale:**

Automotive audio electronics is a fast paced industry that is constantly evolving. Many of our current shop students are already experimenting with their own stereo installations. Most are not installed in a professional manner. This course would provide students with the proper skills, knowledge and experience to do the job properly. In addition to receiving high school course credits, students would also benefit from an industry accepted certification by the Consumer Electronics Association. Students can take on part-time work and be qualified to do so. Currently the closest high school that offers such a program is in North Carolina. W.J. Mouat could be the only school in Canada that offers this unique certification course to students. There is a need in the industry for certified installers. Students will leave high school with a firm understanding of the automotive audio electronics industry and will have the required skills to be employable after graduation.

### Organizational Structure:

Unit/ Topic	Title	Time
Unit 1	Charging and Electrical System Measurements	5
Unit 2	Locating, Testing, and Documenting Wiring	10
Unit 3	Basic Audio System Installation	20
Unit 4	Advanced Audio System Installation	20
Unit 5	Basic Security System Installation	15
Unit 6	Remote Starter Installation	15
Unit 7	Troubleshooting and Common Problems	20
Unit 8	Mobile Video System Installation	15
<b>Total Hours</b>		<b>120 Hours</b>

Learning Outcomes:

#### Unit 1: Charging and Electrical System Measurements

This unit will introduce students to the automotive stereo industry and how the course is organized with theory and hands on lab activities. In addition, students will familiarize themselves with the vehicle training aid, the basic tools and learn shop safety. They will learn the basic language of the industry and have hands on experience with various tools and car components.

At the end of this unit it is expected that students will:

- Recognize and identify the key components on the vehicle training aid.
- Identify important components of the vehicle electrical system.
- Gather basic information for the use in measurements that will be used in subsequent lab activities.
- Determine the vehicle's current state of electrical health.
- Learn basic uses for a Digital Multi-meter (DMM)
- Determine the vehicle's ability to support aftermarket equipment, in particular audio amplifiers.
- Associate electrical upgrades with electrical demands.
- Learn basic audio system design.

#### Unit 2: Locating, Testing, and Documenting Wiring

This unit will cover the basic knowledge of automotive electrical circuits and the associated components. Students will also learn about different electrical parts and techniques such as crimp connectors, wire gauge and soldering. Students will examine and test the following circuits: ignition switch, headlight/parking light, door lock, dome light, trunk release and brake light. Students will complete both theory tests and lab activities during this unit.

At the end of this unit it is expected that students will:

- Learn how to correctly make crimp connections.
- Understand the color applications for crimp connectors.
- Evaluate if crimping is appropriate in a particular installation situation.
- Correctly perform soldered connections.
- Understand the components used in soldering.
- Evaluate if soldering is appropriate in a particular installation situation.
- Perform circuit testing using a digital multi-meter.
- Develop proper procedures for circuit testing.
- Understand the different types of circuit tests.
- Examine wiring and circuits controlled by the ignition switch.
- Test each ignition switch circuit.
- Determine the polarity and function of each individual wire connected to the ignition switch.
- Examine wiring and circuits controlled by the headlight switch.
- Test each headlight switch circuit.
- Determine the polarity and function of each individual wire connected to the headlight switch.
- Examine wiring and circuits controlled by the door lock/unlock switch.
- Test each door lock/unlock switch circuit.
- Determine the polarity and function of each individual wire connected to the door lock switch.
- Examine wiring and circuits controlled by the door pin switches.
- Test each door pin switch circuit.
- Determine the polarity and function of each individual wire connected to the door pin switches, dome lights, and other interior courtesy lights.
- Examine wiring and the circuit controlled by the trunk release switch.
- Test the trunk release switch circuit.
- Determine the polarity and function of each individual wire connected to the trunk release switch.
- Examine wiring and the circuitry controlled by the foot brake switch.
- Test the brake switch circuit.
- Determine the polarity and function of each individual wire connected to the foot brake switch.

### **Unit 3: Basic Audio System Installation**

This unit will introduce students to basic stereo installation. Students will practice removing an OEM headunit and replace it with an aftermarket unit.

At the end of this unit it is expected that students will:

- Examine the physical attributes of an aftermarket headunit.
- Read the installation instructions.
- Read the owner's manual.

- Make assessments of how much audio system growth the new headunit will allow.
- Install aftermarket speakers.
- Make the electrical basic connections for a drop in speaker addition.
- Evaluate absolute phase for maximum sound quality.
- Install an aftermarket headunit.
- Determine the basic connections and installation accessories require for a headunit replacement.
- Perform basic set-up and programming for delivery to the customer.
- Reinstall the OEM headunit
- Restore original factory function to the audio system.

#### **Unit 4: Advanced Audio System Installation**

This unit will look at the installation and configuration of aftermarket amplifiers. Students will look at different ways of increasing amplification and selecting the best method for the job at hand. Students will practice installing an audio amplifier using different configurations.

At the end of this unit it is expected that students will:

- Examine the physical attributes of an aftermarket amplifier.
- Read the installation instructions.
- Read the owner's manual
- Run multiple speakers from a single channel.
- Wire series and parallel configurations.
- Examine the electrical differences presented by series and parallel wiring configurations.
- Install an aftermarket amplifier as an OEM upgrade.
- Integrate an LOC on to an OEM headunit.
- Evaluate the increased performance and overall value.
- Install an aftermarket headunit as a second step following the installation of the aftermarket amplifier.
- Reconfigure preamp level outputs and signal cables for additional feature found in the aftermarket headunit.
- Reconfigure the amplifier inputs and onboard controls where necessary.
- Bridge an amplifier to increase power into one speaker.
- Bridge an amplifier to 2 speakers with the same power of an alternative configuration to stereo left and right subwoofers.
- Understand the benefits of bridging amplifier channels.
- Understand that bridging is not suitable for all speaker configurations in every system.
- Install an aftermarket power antenna.

## **Unit 5: Basic Security System Installation**

This unit will introduce the basic vehicle security system. Students will learn about the basic components in a security system. Students will practice installing a basic vehicle alarm system.

At the end of this unit it is expected that students will:

- Examine the physical attributes of an aftermarket security system.
- Read the installation instructions.
- Read the owner's manual.
- Evaluate the various security system inputs and outputs so that they can interface into the vehicle properly.
- Leverage wiring data about the vehicle you've collected or that is available from a technical resource.
- Perform tap in type connections.
- Determine where to position critical system components to maximize security and reliability.
- Perform the programming and configuration process for a given security system.
- Check for wire loops, dip switches, or jumper pin programmable features.
- Power up the security system.
- Perform a quick test of inputs and outputs.
- Program features or operational characteristics that require power.

## **Unit 6: Remote Starter Installation**

This unit will look at the procedures for installing a vehicle remote starter system. This includes selecting the proper components, basic automotive car wiring, and testing procedures.

At the end of this unit it is expected that students will:

- Examine standard SPDT automotive relays and how they work.
- Use relays in various applications.
- Determine why relays need to be used in certain applications.
- Examine common silicon diodes and how they work.
- Use diodes in various applications.
- Determine why diodes need to be used in certain applications.
- Install relays and diodes into the basic security system.
- Determine why relays or diodes are needed for certain situations.
- Perform the correct connection procedures for relays and/or diodes.
- Examine the physical attributes of an aftermarket remote starter system.
- Read the installation instructions.
- Read the owner's manual.
- Evaluate various remote starter system inputs and outputs to determine how they can interface into the vehicle properly.

- Leverage wiring data about the vehicle you've collected or that is available from a technical resource.
- Perform tap in type connections and how to handle critical high current connections.
- Position critical system components to maximize reliability.
- Perform the programming and configuration process for a given remote starter system.
- Check for wire loops, dip switches, or jumper pin programmable features.
- Power up the remote starter system.
- Perform a quick test of inputs and outputs.
- Program features or operational characteristics that require power.
- Evaluate overall effect of voltage drops and the points at which they can originate.
- Measure voltage drops between two points.
- Diagnose a voltage drop against a known good reference measurement.
- Investigate short circuits and determine how they can originate.
- Locate a short circuit between two points.
- Repair a short circuit.
- Examine open circuits and determine how they can originate.
- Locate an open circuit between two points.
- Repair an open circuit.
- Identify and isolate a problem unknown to you.
- Measure critical components and evaluate if they are functioning properly or not.
- Diagnose which component, if any is a fault for the problem(s) you find.

### **Unit 7: Mobile Video System Installation**

This unit will look at the installation procedures for mobile video systems. This includes components such as headphone jacks, head rest video screens and entertainment systems.

At the end of this unit it is expected that students will:

- Identify the components used in a rear seat video entertainment system.
- Read the installation instructions for each component.
- Read the owner's manuals for each component.
- Perform the installation process for a standalone system not requiring interaction with the existing audio system.
- Install a rear seat entertainment system as a standalone system not requiring interaction with the existing audio system.
- Determine proper placement and installation of the video source component.
- Determine proper placement and installation of the video screen(s).
- Determine proper placement and installation of the wireless headphone transmitter.
- Add sound for the video system through the OEM audio system.
- Provide an alternative or addition to wireless headphones.

**Instructional Component:**

Students will be taught in an environment that utilizes both lecture and hands on work. Students will be encouraged to work in groups and are expected to keep a high level of professionalism. Through demonstrations and lab work, students will gain experience and competency for the prescribed learning outcomes. Upon successful completion of the theory component, students can work on practice exams before applying to write the formal certification exam. Students who pass the exam will receive a mobile electronics certified professional (MECP) certificate. In addition, a practical component of the course includes numerous labs that accompany the specialized car training aid. This course is essential to the students learning the skills necessary for a job in the car audio industry.

**Assessment Component:**

Students will be marked in accordance with school district policy and marks will be assigned on the following basis:

Summative:

Assessment of core concepts for mastery	20%
Practical application of theory and skill mastery (labs)	70%

Formative:

Demonstration of shop procedures	10%
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**Learning resources:**

Students will be using the Basic Mobile Electronics Installer Study Guide for the theory component. This is published by the Consumers Electronics Association. The use of a specially designed training aid by Marcrafft Educational Technologies with accompanying labs will fulfill the practical component of the course.

**Additional Information:**

This proposed course will use all the guidelines and resources as outlined by Marcrafft Educational Technologies. The course was designed as an industry training standard by the Consumer Electronics Association. Those who are successful in completing the course will be able to seek employment as a certified automotive audio technician. WJ Mouat Secondary can become a testing facility for Marcrafft and we can offer the final exams in house. I look forward to teaching this course and the many opportunities that are available for the students.