LOS ANGELES UNIFIED SCHOOL DISTRICT

DIVISION OF ADULT AND CAREER EDUCATION

SAFETY MANUAL FOR INDUSTRIAL EDUCATION

AUTO BODY REPAIR

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GENERAL SAFETY INSTRUCTIONS

1) THINK SAFETY ……AND PASS THE SAFETY TEST

a) You are individually responsible for putting safety first. Put safety first. Be ready and willing to work safely. Your life may be at stake! More accidents are caused by unsafe acts of people than by unsafe conditions.

b) Before working with any machine, equipment, or tool, you must receive safety instructions, pass the safety test, and be sure that an instructor is present in the shop.

c) Look for, read, and obey all the warning signs posted in the shop that are placed there to call your attention to possible dangers.

d) Become familiar with the school's fire signal, fire drill procedures, and fire exits. In case of fire alarm, turn off all power and flames and walk quietly to the nearest exit. Follow the instructor's directions.

2) REPORT TO YOUR INSTRUCTOR WHENEVER:

a) Any student, including yourself, feels ill or has even the slightest injury, accident, burn, or electric shock. Report to your instructor any burn or shock as soon a possible.

b) You see anyone breaking a safety rule, such as clowning, running, snapping rags, playing around, or otherwise acting in an unsafe manner. A playful push may cause a fall and injure someone.

c) You find a faulty tool, unquestionable equipment, or a safety guard removed from a machine. Report any machine out of adjustment or in need of repair, or any other unsafe shop condition. Take damaged or broken tools to your instructor. Tag the tool as unsafe. Report any machine that does not operates correctly.

3) ASK YOUR INSTRUCTOR'S PERMISSION BEFORE:

a) Using any power machine or test equipment. You are permitted to work with machines and equipment only after you have been given safety instructions. Every machine is dangerous if operated incorrectly. You must be instructed in safe operation.

b) You are not permitted to work with any machine or equipment before, during, or after class hours unless you have received permission and there is an instructor in the shop or project area. Should you or any other student get injured, report it to the instructor immediately.

c) Always obtain the instructor's permission before starting a car, test-running an engine, working under a car, using a battery charger, jacks, lifts, axle stands, or hoists.

4) WEAR PROTECTIVE CLOTHING

a) **It is mandatory to wear safety glasses or a face shield** to protect your eyes and face from sparks, flames, blinding light, solvents, soldering fluxes, chemicals, battery acid, brake fluid, air conditioning refrigerants, or particles from air hoses, grinders, or buffers. California law states that "Eye protective devices shall be worn…while repairing or servicing any project or operating any machinery or equipment" in the shop area.

b) Wear a cap and properly fitting clothing. All loose clothing and hair should be tucked out of danger from being caught in wheels, drive belts, or gears. Do not wear ties, scarves, dangling chains, or jewelry in the shop. These can get caught in moving components.

c) When you are working on electrical circuits, remove metal watchbands or rings. They can conduct electricity and cause burns.

d) Wear solid shoes rather than sandals or sneakers. They protect your feet from falling objects or floor litter and sparks. To prevent slipping, shoes should have full tops and rubber soles and heals in good repair. Shoes with worn soles are dangerous if the wearer steps on a nail.

e) Wear gloves when handling hot metal, hot manifolds, exhaust pipes, solder, chemicals, sharp objects, or electric wires. Do not wear gloves when they might get caught in machinery.

f) Immediately rinse with plenty of water any part of your body or clothing that comes in contact with battery acid. Use a battery lifter (lifting tool) to pick up or carry a battery to prevent spilling acid or dropping the battery.

5) LIFTING AND CARRYING SAFETY

a) Grasp any object to be lifted with a firm grip and lift with your legs, not with your back. Squat down and keep your back and head in as straight a line as possible when you lift. Keep your back vertical and use your leg muscles for lifting.

b) Get help with large or heavy objects. Make sure the path to where you are moving the object is clear. Clear the path from the area where the object is located at to the area where it is to be set down.

c) Do not twist your body when moving or carrying things.

d) Set objects down keeping the back and head straight and lower with your legs and not your back (in the same way that you lifted the material). Use your leg muscles and keep your back straight.

6) PREVENT FIRE AND BURNS

a) Remember that there is so much gasoline to be found around auto shops that there must be NO SMOKING in the work area. A fire can be started very easily from gasoline. In the case of fire, follow only your instructor's directions. Know and practice the fire drill rules. Locate the exits.

b) Never use or operate any equipment that generates sparks and flames near any flammable or combustionable materials. Keep all rags containing oil, gasoline, paint, solvents, or any other combustibles in covered metal containers.

c) Never use gasoline near flames, sparks, potential sparks, or radiators. Do not use gasoline for cleaning of any kind. Never pour gasoline into the carburetor throat while cranking the engine with the starter. This can cause dangerous backfires. Do not use your hand as a choke when the engine is being cranked or is running. This wets your hand with fuel, and you could receive a serious hand burn from a backfire.

d) Be careful when picking up metal tools and other equipment sitting in the sun or has been used. It might be hot and could cause a burn.

e) Never remove a hot radiator cap. The steam could cause burns. Let the cap cool for a few minutes, then release it slowly, using a rag to protect your and your arm.

f) Check closely for leaks around fuel lines and fittings. A bad fire or explosion can result from an accidental spark.

g) Do not use paint, enamel, lacquer, or solvents near flames or sparks. They are combustible (flammable, or catch on fire easily). Read labels on containers before using, or ask your instructor for directions.

h) All used rags including those containing oil, gasoline, paint, solvents, or other similar burnable materials must be returned to the tool room and placed in a covered metal container.

i) When welding or brazing, set up the work so that the flame from the torch will not come in contact with the concrete floor. Cement will shatter under high heat. Never weld near a gas tank, gas pipe, or containers that have held gasoline or flammables: vapors are always present and can explode.

j) Remember that the gas given off by a battery during changing is very explosive. Turn off the battery charger while connecting or disconnecting the lead wire or cables. Keep all open flames and sparks away from the battery. Be sure there is plenty of air circulating in the area.

k) Never leave tools lying on the top of a battery. They may cause a short circuit and a fire.

7) GENERAL SHOP SAFETY GUIDELINES:

a) Keep the floor, aisles, and passageways clear of parts, stock, materials, scraps, tools, and equipment. Place all scrap material in designated areas.

b) Clean up immediately any liquids or grease spilled on the floor to prevent slips and falls and to reduce fire danger.

c) When cleaning dust or filings off of tools, use low-pressure nozzles. Do not blow compressed air on your body to clean off clothes, body parts or for any other reason. Drain the water filter before using air tools.

d) Do not drive vehicles in the shop area or school compound faster than four miles per hour. A maximum of four miles is a safety precaution in case other students step out suddenly in the path of the car.

e) To prevent possible injury, the doors of a vehicle should be kept closed whenever possible while working on the exterior or interior. A vehicle door should only be open while the student is working on a project involving a door system repair. Do not leave an area with the vehicle doors open

f) Be sure the transmission is out of gear, and the emergency brake is on, to prevent the car from moving and causing injury or damage when starting an engine.

g) Never start an engine while someone is under the car. Suddenly moving vehicle components might hurt someone. Prevent being hit by falling objects while working under a car by first checking to see that no loose objects are on top of fenders, bumpers, or other parts of a car.

8) HAND TOOLS AND BENCH WORK

a) Use the right tool for the right job. Hand tools come in many shapes and sizes and are made to do specific jobs with safety and ease. Using any available tool to "get by" is one of the main causes of hand tool accidents. Do not, for example, use a wrench as a hammer or a screwdriver as a chisel or pry bar. Only use tools that are in safe condition. Report sub-standard or unsafe tools to the instructor and tool keeper.

b) Do not throw tools or materials to others since this can endanger eyes, hands, and body parts. Pass tools directly, with handles extended. Do not leave tools or materials projecting from a vise, workbench, or pants pockets. Other students can bump into them.

c) Keep all tools clean. Do not let oil, grease, or dirt accumulate on the tool or on your hands. Avoid using wrenches with cracked, sprung, or worn jaws. A wrench slipping usually causes a painful hand injury.

d) The right size and shape of a tool is important to the job. Every tool has a "built-in" safety limit or capacity. Learn how to read the tables from tool manufacturers that tell each tool's "work load." Overloading a tool can easily lead to breakage and injury.

e) Make sure that handles are used on all tanged tools such as files, chisels, and scrapers. Do not carry sharp-edged tools in your pockets. Objects can cut hands or puncture body parts during a fall.

f) Keep sharp edged tools sharp. A dull tool is more dangerous than a sharp tool because it will slip over work or slip away from the work. It could require more pressure or be difficult to control. When using sharp-edged tools, cut away from your body. A tool facing toward you can slip and cut you. Also, be sure no one else is standing in front of your work. Keep fingers away from cutting edges and never test the edge of the blade by drawing fingers across it.

g) **Chisel:** hold a chisel with both hands unless one hand is used to drive the tool with a mallet. Sharpen chisels carefully. Grind off mushroomed heads on chisels, hammers, punches, and similar tools before using them. Sharp pieces from a mushroomed tool head may fly off.

h) **Screwdrivers:** always use the appropriate size and type of screwdriver for the job. Hold the screwdriver with one hand. Keep fingers behind the screwdriver tip. Do not hold small articles in the palm of your hand while tightening the screws. Hold the items with a vise grip or vise. Screwdrivers with worn, chipped, or broken tips are dangerous and do not have enough of a grip on the screwhead and often jump the slot, injuring the user.

i) **Hammers:** make sure the handle fits tightly into the head of a hammer, and that the handle itself is not split. Do not strike two hard surfaces together, such as a hammer head or a hammer and anvil face. When hard steel strikes hard steel, a chip may fly off like a bullet.

j) **File:** do not use a file unless it has a handle. The tang, or pointed end of a file, is sharp and may puncture your hand unless a handle protects the end. Clean a file with a file brush rather than by taking it on the side of the bench. The file is very hard and brittle. It can break and send sharp pieces flying. Do not use a file as a pry bar.

k) **Wrench:** use the wrench of the right size and kind for the job. A wrench or socket one size too large will not grip the corners of a nut correctly. This can cause a bad slip during a heavy pull. Do not use pliers in place of a wrench.

l) Never leave tools sticking out from a vise or workbench where someone might bump against them. Carry any sharp-edged tool so the point or edge is held down toward the floor. Never carry sharp-edged tools in your pocket or pointing toward your body. You could slip or fall against them and hurt yourself. Never tighten an unused vise. The tightened handle may stick out into a walkway and cause injury.

m) Avoid sliding your fingers along the edges of metal surfaces. Many metal parts have razor-sharp edges and burrs along the sides.

9) SHOP PRACTICE

a) Keep floor, aisles, and passageways clear of stock, materials, and scraps. Arrange air hoses, extension cords, machine attachments, and large parts so that no one can trip over them.

b) Floor jacks and creepers should be returned to the tool room or put away when they are not in use. Never ride creepers, rolling jacks, or other movable equipment. Stepping on a creeper can cause a bad fall. The creeper should be stored standing upright when not in use.

c) Be sure the large shop doors are open for air circulation when engines are running. Carbon monoxide fumes are odorless, colorless, tasteless, and deadly poison. The symptoms of carbon monoxide poisoning are disorientation, nausea, vomiting, headache, and/or dizziness. If you see any student with these symptoms report it to your instructor immediately.

d) Avoid spray paint fumes; they are poisonous. Spray painting should be done only in a properly ventilated spray booth.

e) Be aware of people working under vehicles. If a leg is sticking out, it could trip someone or could be run over. Never start an engine while anyone is under the car.

f) Prevent injury from falling objects while working under a car by first checking to see that no loose objects are lying on the fenders, bumpers, or other parts. Be careful not to drop anything on a co-worker below you.

g) Never point an air nozzle toward yourself or others. The air from an air nozzle pointed toward a person may break an eardrum, blow particles into eyes, or cause other injuries. Never use an air hose to clean dust from clothing. Be sure the air hose guard is on the nozzle so that the nozzle cannot be placed directly against an object or person. When using an impact wrench with a flexible socket, do not remove the socket from the nut or bolt until the wrench has stopped completely; otherwise, the flexible socket may fly off at high speed.

10) OPERATE POWER MACHINERY SAFELY

a) The right size and shape of the tool is important to the job. Every tool has a "built-in" safety limit or capacity. Read the tables and instruction manuals from the tool manufacturer. They have information on the tool's range of workload. Overloading a tool leads to breakage and injury.

b) Do not distract the operator of a machine. Once started, stay with the machine until it is turned off. Never leave a machine running and move away from it.

c) Keep clothes, cords, and loose objects away from moving parts. They can get caught in the equipment causing injury to yourself and possibly others.

d) Use caution when approaching power machines. Stay away from moving parts. Never stand in the direct line or “throw” of any machine. If a machine breaks or becomes overloaded objects can be thrown out with strong force (the stock could not be held securely or knots/slivers can break loose).

e) Use extension cords carefully. Drop the lead wire directly from the wall plug to the floor to avoid tripping over the cord. Inspect the condition of the cord, cap, and body and be sure that insulation and covering are not broken or worn.

f) Before using power tools, pick up loose tools and materials and make certain that all other students are clear of the machines and equipment. Clean, oil or adjust machinery only when the machine is stopped and preferably when the machine is unplugged.

g) Check all adjustments before turning on the power. Verify all adjustments are locked into place before starting. Vibration may cause an adjustment to loosen, slip, or change position. Also, loose objects can be drawn into the moving parts, causing personal injury and damage to the equipment.

h) Keep all sharp-edged tools sharp. A dull tool is more dangerous than a sharp one because it will slip over and away from the work, requires more pressure, and is difficult to control.

i) Never remove guards of safety devices from any machine. They must always be in place when the tool is being used. If for any reason a safety guard is removed, or if the machine is defective in anyway, the machine must not be used until corrections are mead by proper authorities.

j) Remember to wear safety goggles or a face shield whenever you use power machinery.

k) Be sure the power is off when you are oiling, cleaning, or adjusting any equipment to prevent catching your hands or clothing in moving parts.

l) Before turning the power on, be sure that:

   i) You have your instructor's permission to operate the machine.
   ii) All guards and safety devices are in place. Never remove them.
   iii) All adjustments are tightly locked in place because vibration can loosen them.
   iv) Any loose tools or other objects are removed. Vibration can cause them to contact moving parts and be thrown out with terrific force.
   v) Any frayed cord, shock or spark from electrical wires or connections are reported to the instructor.
   vi) Your hands, the floor or surface you are working on are dry. Water conducts electricity, and wet hands or wet floors can give you a shock.
   vii) Do not start any machine you think may have something wrong with it. Tag it as unsafe and report to your instructor and tool keeper any conditions you question.

11) PORTABLE POWER TOOL SAFETY

a) Pneumatic and Electric Hand Drill Safety:

i) Unplug the drill before tightening the chuck. Keep the chuck away from loose objects and clothing where it could bind and cause damage.
ii) Be sure the drill is in the "OFF" position when it is plugged into an electric outlet to prevent things being caught in the rotating drill.
iii) Always hold the switch when operating the drill and be ready to stop the drill at any time. When using a heavy-duty drill, hold the drill with both hands and brace the body securely to avoid injury. Sparks may indicate electrical grounding so discontinue drilling if electric sparks jump from the point of the drill to the work. Contact the instructor for further instructions.
iv) Keep your face away from the portable electric drill. If the drill grabs, the handle is likely to swing around and hit you.
v) Never hold materials to be drilled in your hand while you are drilling.
vi) Extension cords should be connected to avoid the hazard of anyone tripping over them when moving about the job. Arrange the lead wires directly from the wall plug to the floor. Inspection of the condition of the cord and the attachment plug should be made. The insulation or covering must not be broken or worn.

b) Grinder and buffer

i) Adjust the "work rests" on the grinders and emery wheels as close to the wheel as possible to prevent the work from catching between the rest and the wheel. The gap should not be greater than $1/8^{th}$ of an inch. The work rests should be tightly clamped after each adjustment.
ii) Be sure the grinding wheel fits the arbor and is tightened securely. Make sure the side wheel guards are in place.
iii) Keep the tool rest as close to the grinding wheel as possible. The gap should not exceed 1/8 inch since tools or materials can become jammed between tool and rest, causing the grinding wheel to break and throw off particles.
iv) Wear goggles or a face shield while using the grinder or wire wheel. Safety glasses must always be worn during any grinding or buffing operation for eye protection.
v) Use caution when grinding work is held by hands to prevent the work from slipping and injuring fingers. Grind work below the center of the wheel so the wheel cannot throw the work. Never hold the tool downward between the wheel and the rest when grinding. Dangerous jamming of the tool and wheel may result in an injury.
vi) Stand to one side while the grinding wheel is being dressed or started. Grinding on one side of the wheel is dangerous, as the wheel may break from side tension.
vii) Grind on the face of the wheel only, unless the wheel is designed for side grinding, so that the wheel will not break from side tension.

viii) When grinding work is held in the hands, use special care to prevent the work from slipping and causing finger injuries.
ix) Hold small pieces of material with vise grips or a vise to prevent work from slipping and becoming jammed. Never use pliers or rags.
x) Do not push the tool or part being dressed downward between the wheel and the rest while grinding. Jamming the breaking of the tool and wheel can result.
xi) Buff your work below the horizontal axis of the wheel in order that the wheel will not throw the work.

c) Portable Electric Grinder and buffer

i) Place the grinder on its back and be certain that the switch is in the "off" position before plugging the machine into the circuit in order to prevent serious entanglement of you or others in the revolving sander.
ii) Do not use the grinder near flammable material. Sparks may cause an explosion.
iii) When using a grinder, have a solid grip so it won't slip from your hands.
iv) Keep your face away from the sanding disc to protect your face and eyes while buffing. Wear eye protection.

d) Porto-Power

i) Do not stand in direct line of the Porto-Power when jacking out. It may slip and injure you.
ii) Place the Porto-Power so that it does not slip and injure you or others. Instruct others watching you to stand away from the work.

12) AXLE STANDS AND JACKS

a) Be sure your instructor has checked and gave you permission to use any stands or jacks.

b) Use only the jacks, hoists, or lifting machines that have the correct lifting capacity. You will learn how to find out the different capacities of each of these.

c) Block the wheels on the opposite end of any car before jacking. Be sure to check with the instructor before blocking wheels in raising a car. He or she will instruct you according to the type of equipment to be used.

d) Be sure the jack is located under the part to be raised and at a strong section of the car, especially if the body is of unit construction.

e) Place the jack on a clean, solid, level surface.

f) If the jack is used under an axle, make sure the lifting pad is in proper position to prevent slipping.

g) Never crawl under a car that is supported only by a jack.

h) Make sure that axle stands of the same height are used.

i) If any hydraulic jack has an oil leak, notify the instructor and tool keeper right away.

j) After raising the car, leave the jack handle in a straight-up position. This helps prevent a person from tripping over it or from accidentally releasing the shut-off valve.

k) Lower a car slowly when using a hydraulic jack.

13) PAINTING AND REFINISHING

a) Never use an electric drill in the paint booth. Brushes will arc and can explode the vapor.

b) When using a lacquer thinner, be careful not to splash it in the eyes.

c) Lacquer and enamel are very flammable. Fire or explosion will result if it is applied near a flame or a spark.

d) Do not smoke or carry matches into a paint booth.

e) Wear a mask when using a spray gun to prevent breathing injurious fumes.

f) Point the spray nozzle toward work when starting to spray; never toward another person.

g) Make certain the exhaust fan is operating to prevent the accumulation of fumes.

14) OXYGEN-ACETYLENE WELDING

a) Avoid rough handling, dropping, or knocking over cylinders. Rough treatment may damage the fuse plugs or the valve and cause the gas to escape. Keep cylinders from being knocked over while in use. Use a suitable truck, chain or other steadying device. Avoid rough handling, dropping or knocking acetylene cylinders. Rough treatment might damage the fuse plugs or the valve and cause the gas to escape and ignite.

b) Close the cylinder valve when you have finished, and open the blowpipe valve in order to relieve all pressure in the regulator and hose line. Then, close the blow pipe valve. Close cylinder valve and replace valve protection caps before moving the cylinder unless it is securely fastened to the welding cart. Be sure that the space between the cylinders and the job is clear so that the valve can be reached quickly in case of an emergency.

c) Never use valve-protection caps for lifting cylinders from one vertical position to another. Valve protection caps are designed to protect valves from being damaged.

d) Acetylene is a fuel gas. Keep cylinders far enough away from the welding or cutting work so that sparks, hot slag, or flame will not reach them. Never allow cylinders to come into contact with live wires, third rails, or ground wires from electrical equipment. Keep cylinders far enough away from welding or cutting work so that sparks, hot slag, or flame will not reach them. Never open an acetylene cylinder valve near other welding or cutting work, or near sparks, flame or any other possible source of ignition.

e) Be thoroughly acquainted with the purpose, characteristics, and dangers of oxygen. Oxygen is to be called "oxygen," air is to be called "air," and acetylene is to be called "acetylene" when calling for or speaking about the various gasses. Never use oxygen in place of compressed air and do not confuse the two. Be thoroughly acquainted with the characteristics and dangers of oxygen. Oxygen or acetylene should never be used as a pressure supply; do not use to blow out oil lines, gasoline lines or gas tanks. Do not use for pressure on blow torch or preheating outfit. Oxygen should never be allowed to saturate any part of the clothing because the spark might quickly start a fire.

f) Regulators should always be attached to cylinder tanks to maintain a safe, constant working pressure. Oxygen and acetylene regulators must not be interchanged.

g) Release the pressure adjusting screw on the regulators before opening the cylinder valve.

h) Never use more than 15 pounds pressure on the line gauge or an acetylene regulator. When opening cylinder valves, do not open suddenly as the pressure gauge might explode. Stand to one side of and away from gauge faces and front of the regulator.

i) Close cylinder valves when work is finished, and open the blow pipe valve briefly in order to relieve all pressure in the regulator and hose line; then close the blow pipe valve. Always close valves of empty cylinders in storage to prevent waste and fire hazards.

j) Open acetylene valves a maximum of 1 1/2 turns.

k) The T-wrench must be left in place on the valve while the cylinder is in use so that the acetylene can be turned off quickly in case of emergency. Also, keep the space between the cylinder and the job clear so that you can reach the valve quickly in case of an emergency.

l) Use soapy water to test for leaks around cylinder valves or fittings of equipment. Under no circumstances use a lighted match.

m) The acetylene hose connection has a left-hand thread and it will break if too much pressure is applied. Light the torch with a friction lighter.

n) Always use the correct amount of gas for a given size-welding tip. Cutting down the size of the flame will cause popping of the flame and scattering of hot metal. Close torch valves quickly in case of flashbacks.

o) Do not use acetylene or oxygen as a pressure supply. Do not use them to blow out oil lines, gasoline lines, or gas tanks. Do not attempt to use one cylinder to charge or fill another. Be sure that acetylene does not saturate any part of your clothing. A spark could ignite it.

p) Do not exchange tools and accessories with other students. Turn off flame at all times when you are not actually welding.

q) Be certain there is no oil or grease on hands and never let oil or grease come in contact with oxygen or any of the equipment through which oxygen passes. Oil and grease may ignite violently in the presence of oxygen under high pressure.

r) Wear proper goggles or helmet when welding with acetylene or watching the operation.