

Identifier	Poplar - Master - Collision Repair Technology		Introduced	Completed
M CR 1	SAFETY			
M CR 1.1.01	General Rules	Design a general shop safety improvement plan.		
M CR 1.2.01	Fire Safety	Design a fire safety improvement plan.		
M CR 2	STRUCTURAL ANALYSIS AND DAMAGE REPAIR			
M CR 2.1.01	Frame	Remove and replace damaged structural components according to manufacturer's specifications/procedures.		
M CR 2.2.01	Inspection/ Repair	Remove and replace damaged sections of structural steel body panels in accordance with manufacturer's specifications/procedures.		
M CR 2.2.02	Inspection/ Repair	Determine the extent of damage to aluminum structural components; repair, weld, or replace in accordance with manufacturer's specifications/procedures.		
M CR 2.3.01	Glass	Remove and reinstall or replace fixed glass (heated and non-heated) using manufacturer's specifications/ procedures and recommended materials.		
M CR 2.3.02	Glass	Remove and reinstall or replace modular glass according to manufacturer's specifications, procedures and recommendations.		
M CR 2.4.01	Welding/ Cutting	Weld and cut aluminum according to manufacturer's specifications.		
M CR 2.4.02	Welding/ Cutting	Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded.		
M CR 2.4.03	Welding/ Cutting	Identify the cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.		
M CR 3	NONSTRUCTURAL ANALYSIS AND DAMAGE REPAIR (BODY COMPONENTS)			
M CR 3.1.01	Preparation	Apply undercoating to protect underside of vehicle.		
M CR 3.1.02	Preparation	Apply seam sealer to appropriate areas after panel replacement.		
M CR 3.2.01	Panels	Determine the extent of damage to aluminum body panels; repair or replace in accordance with manufacturer's specifications.		
M CR 3.2.02	Panels	Weld damaged or torn steel body panels; repair broken welds.		
M CR 3.2.03	Panels	Replace door skins according to manufacturer's procedures.		
M CR 3.2.04	Panels	Perform panel bonding according to manufacturer's specifications.		
M CR 3.3.01	Finishing/ Filling	Heat shrink stretched panel areas to proper contour according to manufacturer's specifications.		
M CR 3.4.01	Glass/ Hardware	Inspect, adjust, repair or replace window regulators, run channels, glass, power mechanisms, and related controls.		
M CR 3.5.01	Welding/ Cutting	Weld and cut aluminum using manufacturer's specifications/procedures.		
M CR 3.5.02	Welding/ Cutting	Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stick-out, voltage, polarity, flow rate, and wire-feed speed required for the material being welded.		
M CR 3.5.03	Welding/ Cutting	Identify cause of contact tip burn-back and failure of wire to feed; make necessary adjustments.		
M CR 3.6.01	Plastics	Remove or repair damaged areas from rigid exterior sheet-molded compound (SMC) panels.		
M CR 3.6.02	Plastics	Replace bonded sheet-molded compound (SMC) body panels; straighten or align panel supports.		
M CR 4	MECHANICAL AND ELECTRICAL COMPONENTS			
M CR 4.1.01	Suspension/ Steering	Remove, replace, inspect or adjust power steering pump, pulleys, belts, hoses, fittings and pump mounts.		
M CR 4.1.02	Suspension/ Steering	Remove and replace power steering gear (non-rack and pinion type).		
M CR 4.1.03	Suspension/ Steering	Remove and replace power rack and pinion steering gear; inspect and replace mounting bushings, tie rod ends, bellow boots, and brackets; ensure proper mounting location.		
M CR 4.1.04	Suspension/ Steering	Inspect and adjust (where applicable) steering linkage geometry (attitude/parallelism).		
M CR 4.1.05	Suspension/ Steering	Inspect and replace pitman arm.		
M CR 4.1.06	Suspension/ Steering	Examine and replace relay (center link/intermediate) rod.		
M CR 4.1.07	Suspension/ Steering	Check, remove and replace idler arm and mountings.		
M CR 4.1.08	Suspension/ Steering	Inspect, remove and replace tie rod sleeves, clamps, and tie rod ends.		
M CR 4.1.09	Suspension/ Steering	Inspect, remove and replace upper and lower control arms.		
M CR 4.1.10	Suspension/ Steering	Examine, remove and replace upper and lower control arm bushings, shafts and rebound bumpers.		
M CR 4.1.11	Suspension/ Steering	Inspect, remove and replace upper and lower ball joints.		
M CR 4.1.12	Suspension/ Steering	Inspect, remove and replace steering knuckle/spindle/hub assemblies (including bearings, races, seals, etc.).		
M CR 4.1.13	Suspension/ Steering	Examine, remove and replace front suspension system coil springs and spring insulators (silencers).		
M CR 4.1.14	Suspension/ Steering	Examine, remove, replace, and adjust suspension system torsion bars, and inspect mounts.		
M CR 4.1.15	Suspension/ Steering	Inspect, remove, and replace rear suspension system transverse links, control arms, stabilizer bars, bushings, and mounts.		
M CR 4.1.16	Suspension/ Steering	Diagnose, inspect, adjust, repair or replace active suspension systems and associated lines and fittings.		
M CR 4.1.17	Suspension/ Steering	Inspect, remove, replace, and align front and rear frame (cradles/sub).		
M CR 4.1.18	Suspension/ Steering	Inspect, remove and replace steering shaft U-joint(s), flexible coupling(s), collapsible columns and steering wheels.		
M CR 4.1.19	Suspension/ Steering	Adjust front and rear wheel camber on suspension systems with camber adjustments.		
M CR 4.1.20	Suspension/ Steering	Adjust caster on suspension systems with caster adjustments.		

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M CR 4.1.21	Suspension/ Steering	Check and adjust wheel toe including centering steering wheel; determine needed adjustment or repair.		
M CR 4.1.22	Suspension/ Steering	Identify toe-out-on-turns (turning radius) related problems; determine needed repairs.		
M CR 4.1.23	Suspension/ Steering	Identify SAI (steering axis inclination), included angle, and KPI (king pin inclination) related problems; determine needed repairs.		
M CR 4.1.24	Suspension/ Steering	Identify thrust angle related problems; determine needed repairs		
M CR 4.1.25	Suspension/ Steering	Diagnose wheel/tire vibration, shimmy, and tramp (wheel hop) problems; determine needed repairs.		
M CR 4.2.01	Electrical Components	Check for voltage drop in the electrical wiring circuits and components with a DMM (digital multimeter).		
M CR 4.2.02	Electrical Components	Inspect, test, and replace fusible links, circuit breakers, and fuses.		
M CR 4.2.03	Electrical Components	Identify programmable electrical/electronic components; record data for reprogramming before disconnecting battery.		
M CR 4.2.04	Electrical Components	Inspect, test, and repair or replace switches, relays, bulbs, sockets, connectors, and wires of all interior and exterior light circuits.		
M CR 4.2.05	Electrical Components	Inspect, remove and replace components of keyless lock/unlock devices and alarm systems.		
M CR 4.2.06	Electrical Components	Analyze, remove and replace components of electrical sunroof and convertible top.		
M CR 4.2.07	Electrical Components	Check for module communication errors using a scan tool.		
M CR 4.2.08	Electrical Components	Use wiring diagrams during diagnosis of electrical circuit problems.		
M CR 4.3.01	Brakes	Pressure test brake hydraulic system; determine needed repair.		
M CR 4.3.02	Brakes	Adjust brake shoes; remove and reinstall brake drums or drum/hub assemblies and wheel bearings.		
M CR 4.3.03	Brakes	Identify and replace ABS wheel speed sensor components according to manufacturer's specifications.		
M CR 4.4.01	Air Conditioning	Remove and replace A/C compressor; inspect, repair or replace A/C compressor mount.		
M CR 4.4.02	Air Conditioning	Inspect, repair or replace A/C system mufflers, hoses, lines, fittings, and seals.		
M CR 4.5.01	Cooling Systems	Student will safely remove radiator cap, after engine is cooled, preventing injury to technician.		
M CR 4.6.01	Drive Train	Remove and replace powertrain assembly; inspect, replace, and align powertrain mounts.		
M CR 4.6.02	Drive Train	Remove and replace drive axle assembly.		
M CR 4.6.03	Drive Train	Inspect, remove and replace half shafts and axle constant velocity (CV) joints.		
M CR 4.6.04	Drive Train	Inspect, remove and replace drive shafts and universal joints.		
M CR 4.7.01	Fuel Intake/ Exhaust	Inspect, remove and replace exhaust pipes, mufflers, converters, resonators, tail pipes, and heat shields.		
M CR 4.8.01	Restraint Systems	Inspect, remove, replace, and dispose of deployed SRS modules in accordance with manufacturer's specifications/procedures.		
M CR 4.8.02	Restraint Systems	Verify that SRS is operational in accordance with manufacturer's specifications/procedures.		
M CR 4.8.03	Restraint Systems	Inspect, remove, replace, and dispose of non-deployed SRS in accordance with manufacturer's specifications/procedures.		
M CR 4.8.04	Restraint Systems	Diagnose and repair SRS using fault codes and testing equipment.		
M CR 5	PAINTING AND REFINISHING PROCEDURES			
M CR 5.1.01	Health Safety Environmental	Execute a complete spray project in accordance with all industry regulations noting the correct procedures for each step along the way.		
M CR 5.2.01	Surface Preparation	Prepare plastic panels for refinishing.		
M CR 5.3.01	Spraying	Student will strain materials preventing clogging.		
M CR 5.3.02	Spraying	Identify all moving parts of a spray gun.		
M CR 5.4.01	Paints	Apply basecoat/clearcoat for panel blending or partial refinishing to achieve invisible repair.		
M CR 5.4.02	Paints	Identify the types of rigid, semi-rigid or flexible plastic parts to be refinished; determine the materials, preparation, and refinishing procedures.		
M CR 5.4.03	Paints	Apply multi-stage (tricoat) coats for panel blending or overall refinishing.		
M CR 5.4.04	Paints	Tint color using formula to achieve a blendable match.		
M CR 5.5.01	Paint Defects	Compare and contrast painting products for effectiveness.		
M CR 5.5.02	Paint Defects	Examine painting work of others and critique successes and ways to improve their work.		
M CR 5.5.03	Paint Defects	Identify, plan, execute a correction to a flawed painting.		
M CR 5.5.04	Paint Defects	Individually begin and complete a full repainting of a vehicle.		
M CR 5.6.01	Detailing	Buff and polish the finish to remove defects as required.		
M CR 5.6.02	Detailing	Remove overspray.		
M CR 6	ESTIMATING			
M CR 6.1.01	Damage Reports	Research the features of computer-generated estimates.		
M CR 6.1.02	Damage Reports	Know and apply the symbols found on computer-generated reports and what the symbols indicate.		
M CR 6.1.03	Damage Reports	Identify the various reasons for overrides on computer-generated report.		
M CR 6.2.01	Repair Estimating	Identify various alignment operations that appear on a damage report and define each.		
M CR 6.3.01	Finishing Types	Measure mil thickness and correctly identify proper film thickness and excessive film thickness.		
M CR 6.3.02	Finishing Types	Define the different types of corrosion.		
M CR 6.4.01	Information	Locate and decode vehicle identification information.		
M CR 6.5.01	Reports	Properly list all information on an estimate.		

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M CR 6.5.02	Reports	Understand sublet.		
M CR 6.5.03	Reports	Memorize local sales tax percentages.		
M CR 7	EMPLOYABILITY SKILLS			
M CR 7.1.01	Problem Solving	Evaluate the benefits of solving a work-related problem.		
M CR 7.1.02	Problem Solving	Identify problems that can be minimized/solved by preventative maintenance procedures.		
M CR 7.1.03	Problem Solving	Develop a flowchart using appropriate symbols and terminology to solve problems		
M CR 7.1.04	Problem Solving	Interpret computer-generated data to troubleshoot a problem.		
M CR 7.2.01	Critical Thinking	Analyze how critical-thinking skills affect work performance.		
M CR 7.2.02	Critical Thinking	Formulate, implement, and evaluate an action plan.		
M CR 7.2.03	Critical Thinking	Demonstrate the skills necessary to identify, analyze, and solve a design problem.		
M CR 7.3.01	Speak, Write, Listen	Demonstrate exemplary customer service skills.		
M CR 7.3.02	Speak, Write, Listen	Interpret and respond to verbal and nonverbal messages.		
M CR 7.3.03	Speak, Write, Listen	Compete in a SkillsUSA job skill demonstration and/or public speaking contest.		
M CR 7.4.01	Technology	Critique the use, benefits and cost of technologically advanced tools and equipment.		
M CR 7.4.02	Technology	Analyze the impact of technological changes on one or more aspects of collision repair by researching current literature.		
M CR 7.4.03	Technology	Compete in a SkillsUSA collision repair technology contest.		
M CR 7.5.01	Leadership and Teamwork	Demonstrate leadership ability within a group or a team.		
M CR 7.5.02	Leadership and Teamwork	Acknowledge and utilize the skills, abilities, and input of all members of the team.		
M CR 7.5.03	Leadership and Teamwork	Demonstrate leadership by listening to others and asking appropriate questions to clarify a problem or issue.		
M CR 7.5.04	Leadership and Teamwork	Compromise and/or build consensus within a group and summarize the decision of the group while maintaining respect for diverse viewpoints.		
M CR 7.5.05	Leadership and Teamwork	Compete in a SkillsUSA Professional Development Program.		
M CR 7.5.06	Leadership and Teamwork	Campaign for a local SkillsUSA chapter office.		
M CR 7.5.07	Leadership and Teamwork	Serve on a committee for a local SkillsUSA chapter.		
M CR 7.6.01	Ethics	Demonstrate time-management skills and cost-effective practices.		
M CR 7.6.02	Ethics	Assume responsibility for decisions and actions.		
M CR 7.6.03	Ethics	Demonstrate time-management and cost-effectiveness practices.		
M CR 7.7.01	Workplace	Recognize the individual roles of team members.		
M CR 7.7.02	Workplace	Acknowledge and utilize the skills, abilities, and input of all members of a team.		
M CR 7.7.03	Workplace	Develop an action plan to accomplish tasks within a given time frame.		
M CR 7.8.01	Career	Develop a community service or job shadowing project.		
M CR 7.8.02	Career	Develop an education/training plan to fulfill long-term career goals.		
M CR 7.8.03	Career	Define advantages and disadvantages of self employment or working for various sizes and types of businesses.		
M CR 7.8.04	Career	Critique results of a job interview.		
M CR 7.8.05	Career	Develop a proposal for an organized community service project.		
M CR 7.8.06	Career	Compete in a state-level SkillsUSA job interview contest.		
M CR 7.9.01	Retention	Maintain an electronic portfolio.		
M CR 7.9.02	Retention	Create a plan for lifelong learning.		
M CR 7.9.03	Retention	Create a presentation illustrating interpersonal skills needed for job retention.		
M CR 7.9.04	Retention	Adapt new knowledge and skills in changing situations.		
M CR 7.9.05	Retention	Analyze how work life is affected by families and how families are affected by work life.		