



ONTARIO COLLEGE OF TRADES

ORDRE DES MÉTIERS DE L'ONTARIO

Apprenticeship
Training Standard

Transmission
Technician

310D

2003

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**COMPETENCY ANALYSIS PROFILE
TRANSMISSION TECHNICIAN
ON-THE-JOB TRAINING STANDARDS
SKILLS**

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MANUAL TRANSMISSIONS/TRANSAXLES U5191.0	Perform visual inspection 5191.01	Diagnose and troubleshoot clutch system and components 5191.02	Repair clutch system and components 5191.03	Verify repair of clutch system and components 5191.04	Diagnose and troubleshoot manual transmissions/transaxles and components 5191.05
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**COMPETENCY ANALYSIS PROFILE
TRANSMISSION TECHNICIAN
ON-THE-JOB TRAINING STANDARDS
SKILLS**

Repair automatic transmissions/transaxles and components 5192.06	Verify repair of automatic transmissions/transaxles and components 5192.07			
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ELECTRICAL AND ELECTRONIC CONTROLS U5193.0	Perform visual inspection 5193.01	Diagnose and troubleshoot electrical systems and components 5193.02	Repair electrical system and components 5193.03	Verify repair of electrical system and components 5193.04	Diagnose and troubleshoot electronically-controlled systems and components 5193.05
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	Repair electronically-controlled systems and components 5193.06	Verify repair of electronically-controlled systems and components 5193.07			
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TRANSMISSION OIL COOLERS U5194.0	Perform visual inspection 5194.01	Diagnose and troubleshoot transmission oil coolers and components 5194.02	Repair transmission oil coolers and components 5194.03	Verify repair of transmission oil coolers and components 5194.04	

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SPECIAL INSTRUCTIONS

NOTE ON SHADED PERFORMANCE OBJECTIVES AND SKILLS:

Shaded performance objectives and skills are optional, that is, they do not have to be completed or signed-off for the apprentice to complete his or her apprenticeship.

PREFACE

This training document was developed by the Workplace Support Services Branch of the Ministry of Training, Colleges and Universities (MTCU) in consultation with representatives from the industry. These Training Standards are intended to be used by the apprentice, trainers and employers/sponsors as a "blueprint" for training or as a prerequisite for government accreditation/ certification.

The care and maintenance of this book is the joint responsibility of the apprentice and the employer/sponsor. The Training Standards were developed specifically for documenting the apprentice's acquisition of skills.

The book becomes the only record of an apprentice's training.

Please Note:

Apprenticeship Training and Curriculum Standards were developed by the Ministry of Training, Colleges and Universities (MTCU). As of April 8th, 2013, the Ontario College of Trades (College) has become responsible for the development and maintenance of these standards. The College is carrying over existing standards without any changes.

However, because the Apprenticeship Training and Curriculum Standards documents were developed under either the *Trades Qualification and Apprenticeship Act* (TQAA) or the *Apprenticeship and Certification Act, 1998* (ACA), the definitions contained in these documents may no longer be accurate and may not be reflective of the *Ontario College of Trades and Apprenticeship Act, 2009* (OCTAA) as the new trades legislation in the province. The College will update these definitions in the future.

Meanwhile, please refer to the College's website (www.collegeoftrades.ca) for the most accurate and up-to-date information about the College. For information on OCTAA and its regulations, please visit: www.collegeoftrades.ca/about/legislation-and-regulations.

IMPORTANT DIRECTIONS TO EMPLOYERS/SPONSORS AND TRAINERS

The Training Standards identify skills required for this occupation and its related training program.

These Training Standards have been written in concise statements which describe how well an apprentice must perform each skill in order to become competent. Competence means being able to do the performance to the required standard on request.

In using these Training Standards, trainers will be able to ensure that the apprentice is developing skills detailed for the occupation.

Trainers and apprentices are required to sign off and date the skills following each successful acquisition.

Employers/Sponsors participating in this training program will be designated as the Signing Authority and are required to attest to successful achievement by signing the appropriate box included at the end of each unit.

IMPORTANT DIRECTIONS TO THE APPRENTICE

1. All hours working for each employer/sponsor(s) should be recorded in the Employer/Sponsor Information section. All Performance Objectives and skills completed while working for each Employer/Sponsor(s) should be recorded.
2. The "Summary of Training" should be completed, signed and dated by both the apprentice and employer/sponsor when either all terms of the training agreement have been completed or the apprentice leaves the employer/sponsor.
3. It is the responsibility of the apprentice to inform the local Apprenticeship Client Services office regarding the following changes:
 - change of employer/sponsor address;
 - change of apprentice name or address;
 - transfer to a new employer/sponsor.
4. At the fulfilment of all terms of the Training Agreement, the Apprentice Completion Form must be completed and signed by the current employer/sponsor. Present these completed and authorized Training Standards and the Apprentice Completion Form to your local Apprenticeship Client Services office.

NOTICE/DECLARATION FOR COLLECTION OF PERSONAL INFORMATION

1. At any time during your apprenticeship training, you may be required to show this training standard to the Ministry of Training, Colleges and Universities (the Ministry). You will be required to disclose the signed Apprenticeship Completion form to the Ministry in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system, including confirming your completion and issuing your certificate of apprenticeship.
2. The Ministry will disclose information about your program completion and your certificate of apprenticeship to the Ontario College of Trades, as it is necessary for the College to carry out its responsibilities.
3. Your personal information is collected, used and disclosed by the Ministry under the authority of the Ontario College of Trades and Apprenticeship Act, 2009.
4. Questions about the collection, use and disclosure of your personal information by the Ministry may be addressed to the:

Manager, Employment Ontario Contact Centre
Ministry of Training, Colleges and Universities
33 Bloor St. E, 2nd floor, Toronto, Ontario M7A 2S3
Toll-free: 1-800-387-5656; Toronto: 416-326-5656
TTY: 1-866-533-6339 or 416-325-4084.

APPRENTICE RECORD #1

EMPLOYER/SPONSOR INFORMATION	
Registered Training Agreement #	
OCOT Membership #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

SKILL I.D. #	EMPLOYER/SPONSOR NAME	EMPLOYER/SPONSOR SIGNATURE	DATE: (mm/dd/yy)

APPRENTICE RECORD #2

EMPLOYER/SPONSOR INFORMATION	
Registered Training Agreement #	
OCOT Membership #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

SKILL I.D. #	EMPLOYER/SPONSOR NAME	EMPLOYER/SPONSOR SIGNATURE	DATE: (mm/dd/yy)

APPRENTICE RECORD #3

EMPLOYER/SPONSOR INFORMATION	
Registered Training Agreement #	
OCOT Membership #	
Name	
Address	
Telephone	
E-mail Address	

SUMMARY OF TRAINING	
Employment Start Date	
Employment End Date	
Total hours of training & instruction between dates of employment.	

SKILL I.D. #	EMPLOYER/SPONSOR NAME	EMPLOYER/SPONSOR SIGNATURE	DATE: (mm/dd/yy)

**If you need additional copies of the Apprentice Record Form, please photocopy as needed.*

APPRENTICE COMPLETION FORM

APPRENTICE NAME	
Print	
Signature	
Client ID	

Skill Sets and Learning Outcomes when completed should be signed by the Supervisor/Trainer and presented with this completion form to your Ministry Local Apprenticeship Office. Any supporting documentation should also be attached.

In-school Completed Yes () No () Not applicable ()
 (Proof to be provided)

Hours completed as
 Per Contract: Yes () No () Not applicable ()

EMPLOYER/SPONSOR INFORMATION	
Name	
Address	
Telephone	
E-mail Address	
Signature of Signing Authority	

MTCU USE ONLY:

Recommended for Exam: Yes () No ()

Signature

Consultant/ Office Code

SKILL SETS COMPLETION FORM

SKILL SET	TITLE	SIGNING AUTHORITY
U5189	Occupational Health and Safety Procedures	_____
U5190	Drive Shafts, Differentials and Drive Axle Assemblies	_____
U5191	Manual Transmissions/Transaxles	_____
U5192	Automatic Transmissions/Transaxles	_____
U5193	Electrical and Electronic Controls	_____
U5194	Transmission Oil Coolers	_____
U5195	Transfer Cases	_____

SPECIAL INSTRUCTIONS

NOTE ON SHADED PERFORMANCE OBJECTIVES AND SKILLS:

Shaded performance objectives and skills are optional, that is, they do not have to be completed or signed-off for the apprentice to complete his or her apprenticeship.

You will be required to disclose this signed form to the Ministry of Training, Colleges and Universities in order to complete your program. The Ministry will use your personal information to administer and finance Ontario's apprenticeship training system. For further information please see the notice/declaration for collection of personal information that is referenced in the table of contents of this training standard.

U5189.0 OCCUPATIONAL HEALTH AND SAFETY PROCEDURES

GENERAL PERFORMANCE OBJECTIVE

Perform occupational health and safety procedures by: identifying and taking action against potential workplace health and safety hazards; handling, storing and disposing of hazardous workplace materials; wearing and maintaining personal protective equipment; complying with workplace-related legislation; interpreting and applying service-related information; practicing good housekeeping in the workplace, and complying with Workplace Hazardous Information System (WHMIS) guidelines; according to company policy, manufacturer’s recommendations and government regulations.

PERFORMANCE OBJECTIVES

SKILLS

5189.01

Identify potential workplace health and safety hazards, including: excessive exhaust and/or explosive fumes, dust, sound levels, electrical and mechanical hazards (i.e. damaged or faulty air lines and/or inadequate ventilation);so that the potential for personal injury, damage to equipment, vehicles, and the environment are minimized; according to government regulations and company policy.

Date Completed

Trainer Signature

Apprentice Signature

5189.02

Handle, store and dispose of hazardous materials, including: chemical solvents, anti-freeze, transmission and brake fluids, engine oil, brake dust, battery acid, refrigerants and gases, using personal protective equipment and specified handling and storage equipment, so that individuals are protected from injury, the environment from contamination and safety procedures are followed; according to government regulations and company policy.

Date Completed

Trainer Signature

Apprentice Signature

U5189.0 OCCUPATIONAL HEALTH AND SAFETY PROCEDURES - Contd.

5189.03 **Wear and maintain personal protective equipment**, including: eye, ear, hand, respiratory, body, and foot protection; ensuring that correct fit and optimum protection is provided to the wearer for the specific task performed; according to manufacturer’s specifications, safety requirements, government regulations, and company policy.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5189.04 **Comply with workplace-related legislation**, relating to highway safety, parts, warranties, occupational health and safety, environmental protection and business and trade practices, including: the *Occupational Health and Safety Act*, *Motor Vehicle Repair Act*, Highway Traffic Act and *Environmental Protection Act*, by: identifying the personal and legal liabilities of technicians and vehicle owners when performing and/or conducting vehicle safety inspections, emissions tests, work estimates and repairing/replacing defective parts; according to government regulations and company policy.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5189.05 **Interpret and apply service-related information**, including: service bulletins, manuals and parts catalogues, by: locating and identifying Vehicle Identification Numbers VIN and accessing microfiche and computerized service information systems, so that the service/repair is performed; according to manufacturer’s recommendations and company policy.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

U5189.0 OCCUPATIONAL HEALTH AND SAFETY PROCEDURES - Contd.

5189.06 Practice good housekeeping in the workplace, by: applying fire hazard prevention methods, including: maintaining a clean and orderly work area; identifying, removing and disposing of potential fire hazards; cleaning up grease, oil spills and/or fluids; ensuring work area is free of obstructions and safely storing tools and shop equipment, in order to minimize accidents or injury to self and others; according to government regulations and company policy.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5189.07 Comply with Workplace Hazardous Materials Information System (WHMIS) guidelines, by: reading and interpreting labels and Materials Safety Data Sheets (MSDS); ensuring receipt of training in WHMIS regulations and practices; according to the *Occupational Health and Safety Act*.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

Employer/Sponsor Name	Employer/Sponsor Signature
_____	_____

U5190.0 DRIVE SHAFT, DIFFERENTIAL AND DRIVE AXLE ASSEMBLIES

GENERAL PERFORMANCE OBJECTIVE

Diagnoses and repairs drive shaft, differential, and drive axle assemblies, by performing a visual inspection; diagnosing and troubleshooting drive shaft, differential, and drive axle assemblies and components; repairing drive shaft, differential and drive axle assemblies; and verifying repair of drive shafts, differential and drive axle assemblies, according to manufacturer's recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5190.01 **Perform visual inspection**, identifying system type and application, checking for: worn, loose, damaged, leaking, missing, or defective components, including: drive shafts, universal and constant velocity (CV) joint assemblies, hangar bearing assemblies, locking hub assemblies, lubrication systems, flanges, yokes, housings, carriers and differentials, axle shafts, gear sets and bearings, wheel end assemblies, controls and actuators, sensors, wiring harnesses, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

**U5190.0 DRIVE SHAFTS, DIFFERENTIALS AND DRIVE AXLE ASSEMBLIES -
Contd.**

5190.02 **Diagnose and troubleshoot drive shaft, differential, drive axle assemblies and components**, including: drive shafts, universal and constant velocity (CV) joint assemblies, hangar bearing assemblies, locking hub assemblies, lubrication systems, flanges, yokes, housings, carriers, differentials, axle shafts, gear sets, bearings, seals, wheel end assemblies, controls, actuators, sensors, wiring harnesses, power train control modules (PCM), and fastening and mounting devices, by visually inspecting, testing, and analysing performance and function, checking for: wear, temperature, colour, tolerances, fractures, vibration/noise, corrosion, gear clash, run-out and phasing, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

5190.03 **Repair drive shaft, differential, drive axle assemblies, and components**, including: drive shafts, universal and constant velocity (CV) joint assemblies, hangar bearing assemblies, locking hub assemblies, lubrication systems, flanges, yokes, housings, carriers, differentials, axle shafts, gear sets, bearings, seals, wheel end assemblies, controls, actuators, sensors, wiring harnesses, power train control modules (PCM), and fastening and mounting devices, by: reconditioning, exchanging, or servicing, using: hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

**U5190.0 DRIVE SHAFTS, DIFFERENTIALS AND DRIVE AXLE ASSEMBLIES -
Contd.**

5190.04 **Verify repair of drive shaft, differential, drive axle assemblies and components**, including: drive shafts, universal and constant velocity (CV) joint assemblies, hangar bearing assemblies, locking hub assemblies, lubrication systems, flanges, yokes, housings, carriers, differentials, axle shafts, gear sets and bearings, wheel end assemblies, controls, actuators, sensors, wiring harnesses, power train control modules (PCM), and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, using hand, power, specialized, and electronic service tools, and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

Employer/Sponsor Name

Employer/Sponsor Signature

U5191.0 MANUAL TRANSMISSIONS/TRANSAXLES

GENERAL PERFORMANCE OBJECTIVE

Diagnoses and repairs manual transmission/transaxles, by: performing a visual inspection; diagnosing and troubleshooting clutch system and components; repairing clutch system and components; verifying repair of clutch system and components; diagnosing and troubleshooting manual transmissions/transaxles and components; repairing manual transmission/transaxles and components, and verifying repair of manual transmission/transaxles and components; according to manufacturer's recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5191.01 **Perform visual inspection**, identifying system type and application, by: checking for: worn, loose, damaged, leaking, missing or defective components, including: housings, shafts, bearings, seals, bushings, linkages, cables, controls, actuators, clutch and pressure plates, friction materials, flywheels, hydraulic cylinders, lines, sensors, power train control modules (PCM), wiring harnesses, fluids/lubricants, coolers, power take-off units (PTO), pumps, filters, level indicators, tubes, yokes, flanges and data displays; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

U5191.0 MANUAL TRANSMISSIONS/TRANSAXLES - Contd.

5191.02 **Diagnose and troubleshoot clutch system and components**, including: pressure plates, cover assembly disc(s), friction materials, intermediate plates, drive mechanisms, switches, solenoids, sensors, wiring harnesses, cables, linkages, release mechanisms and bearings, hydraulic cylinders, lines, flywheel assemblies, pilot bearings, and input (pilot) shafts, by: visually inspecting, testing, and analysing performance and function, checking for: wear, odour, temperature, corrosion, contamination, vibration/noise, colour, fluid level, leaks, pressure, free play, internal adjustment, slippage, disengagement, dragging, and concentric alignment, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5191.03 **Repair clutch system and components**, including: pressure plates, cover assembly disc(s), friction materials, intermediate plates, drive mechanisms, switches, solenoids, sensors, wiring harnesses, cables, linkages, release mechanisms, bearings, hydraulic cylinders, lines, fluid, flywheel assemblies, pilot bearings, and input (pilot) shafts, by: exchanging, reconditioning, or servicing; using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5191.04 **Verify repair of clutch system and components**, including: pressure plates, cover assembly disc(s), friction materials, intermediate plates, drive mechanisms, switches, solenoids, sensors, wiring harnesses, cables, linkages, release mechanisms, bearings, hydraulic cylinders, lines, fluid, flywheel assemblies, pilot bearings, and input (pilot) shafts, by: visually inspecting, testing, and analysing performance and function, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

U5191.0 MANUAL TRANSMISSIONS/TRANSAXLES - Contd.

5191.05 **Diagnose and troubleshoot manual transmissions/transaxles and components**, including: housings, speedometer drives, differentials, linkages, input shafts, main shafts, counter shafts, bearings, seals, lubrication systems, gears, shift collars, thrust washers, synchronizers, gear shift levers, cover assemblies, power take-off (PTO) units, auxiliary sections, yokes, flanges, switches, solenoids, sensors, power train control modules (PCM), wiring harnesses, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, checking for: wear, odour, temperature, corrosion, colour, vibration/noise, gear clash, oil levels, contamination, and alignment; using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5191.06 **Repair manual transmissions/transaxles and components**, including: housings, speedometer drives, differentials, linkages, input shafts, main shafts, counter shafts, bearings, seals, lubrication systems, gears, shift collars, thrust washers, synchronizers, gear shift levers, cover assemblies, power take-off (PTO) units, auxiliary sections, yokes, flanges, switches, solenoids, sensors, power train control modules (PCM), wiring harnesses, and fastening and mounting devices, by: exchanging, reconditioning, or servicing, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

U5191.0 MANUAL TRANSMISSIONS/TRANSAXLES - Contd.

5191.07 **Verify repair of manual transmissions/transaxles and components**, including: housings, speedometer drives, differentials, linkages, input shafts, main shafts, counter shafts, bearings, seals, lubrication systems, gears, shift collars, thrust washers, synchronizers, gear shift levers, cover assemblies, power take-off (PTO) units, auxiliary sections, yokes, flanges, switches, solenoids, sensors, power train control modules (PCM), wiring harnesses, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

Employer/Sponsor Name

Employer/Sponsor Signature

U5192.0 AUTOMATIC TRANSMISSIONS/TRANSAXLES

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair automatic transmissions/transaxles, by: performing a visual inspection; diagnosing and troubleshooting torque converters and components; repairing torque converters and components; verifying repair of torque converters and components; diagnosing and troubleshooting automatic transmissions/transaxles and components; repairing automatic transmissions/transaxles and components, and verifying repair of automatic transmissions/transaxles and components, according to manufacturer's recommendations, specifications and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5192.01 **Perform visual inspection**, identifying system type and application, by checking for: worn, loose, damaged, leaking, missing, or defective components, including: housings, oil coolers, differentials, power take-off (PTO) units, torque converters, housings, gear trains, shafts, hoses, linkages, cables, switches, solenoids, sensors, electronic control modules (ECM), wiring harnesses, flex plates, clutch packs, one-way clutches, band and servo assemblies, pumps, valve bodies, governors, modulators, fluids/lubricants, and data displays; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

U5192.0 AUTOMATIC TRANSMISSIONS/TRANSAXLES - Contd.

5192.02 **Diagnose and troubleshoot torque converters and components**, including: housings, turbines, stators, bearings, bushings, seals, fluids, flex plates, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, checking for: wear, odour, temperature, vibration/noise, corrosion, colour, leaks, contamination, and pressure, using: hand, power, specialized, and electronic service tools and lifting, rigging and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5192.03 **Repair torque converters and components**, including: housings, turbines, stators, bearings, bushings, seals, fluids, flex plates, and fastening and mounting devices, by: exchanging, reconditioning, or servicing, and flushing/cleaning, and pressure, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5192.04 **Verify repair of torque converters and components**, including: housings, turbines, stators, bearings, bushings, seals, fluids, flex plates, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, using hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

U5192.0 AUTOMATIC TRANSMISSIONS/TRANSAXLES - Contd.

5192.05 **Diagnose and troubleshoot automatic transmissions/transaxles and components**, including: housings, oil coolers, differentials, power take-off (PTO) units, gear trains, valve bodies, governor assemblies, clutch packs, data links, information/warning displays, diagnostic lights, shafts, bearings, seals, lines, hoses, fittings, linkages, cables, switches, solenoids, sensors, modules, wiring harnesses, torque converters, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, checking for: wear, odour, temperature, vibration/noise, corrosion, colour, contamination, pressure, slippage, oil level/condition, leaks, shift points and quality, modulator/throttle and governor circuits, and trouble codes, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5192.06 **Repair automatic transmissions/transaxles and components**, including: housings, oil coolers, differentials, power take-off (PTO) units, gear trains, valve bodies, governor assemblies, clutch packs, data links, information/warning displays, diagnostic lights, shafts, bearings, seals, lines, hoses, fittings, linkages, cables, switches, solenoids, sensors, modules, wiring harnesses, torque converters, and fastening and mounting devices, by: exchanging, reconditioning, servicing, or flushing/cleaning, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

U5192.0 AUTOMATIC TRANSMISSIONS/TRANSAXLES - Contd.

5192.07 **Verify repair of automatic transmissions/transaxles and components,** including: housings, oil coolers, differentials, power take-off (PTO) units, gear trains, valve bodies, governor assemblies, clutch packs, data links, information/warning displays, diagnostic lights, shafts, bearings, seals, lines, hoses, fittings, linkages, cables, switches, solenoids, sensors, modules, wiring harnesses, torque converters, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

Employer/Sponsor Name

Employer/Sponsor Signature

U5193.0 ELECTRICAL AND ELECTRONIC CONTROLS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair electrical and electronic controls, by: performing a visual inspection; diagnosing and troubleshooting electrical system and components; repairing electrical system and components, verifying repair of electrical system and components; repairing system warning devices; verifying repair of system warning devices; diagnosing and troubleshooting electronically-controlled systems and components, repairing electronically-controlled systems and components; verifying repair of electronically-controlled systems and components; according to manufacturer's recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5193.01 **Perform visual inspection**, identifying system type and application; by: checking for: worn, loose, damaged, missing, or defective components, including: batteries, cables, terminals, connectors, switches, relays, sensors, modules, wiring harnesses, circuit protection devices, data links, information/warning displays, diagnostic lights and codes, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

U5193.0 ELECTRICAL AND ELECTRONIC CONTROLS - Contd.

5193.02 **Diagnose and troubleshoot electrical systems and components**, including: batteries, cables, terminals, connectors, switches, relays, sensors, modules, wiring harnesses, circuit protection devices, data links, information/warning displays, diagnostic lights and codes, and fastening and mounting devices, by visually inspecting, testing, and analyzing performance and function, checking for: shorts/opens/grounds, temperature, colour, odour, corrosion, vibration/noise, and parasitic draws, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5193.03 **Repair electrical system and components**, including: batteries, cables, terminals, connectors, switches, relays, sensors, modules, wiring harnesses, circuit protection devices, data links, information/warning displays, diagnostic lights and codes, and fastening and mounting devices, by: exchanging, reconditioning, or servicing, using hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5193.04 **Verify repair of electrical system and components**, including: batteries, cables, terminals, connectors, switches, relays, sensors, modules, wiring harnesses, circuit protection devices, data links, information/warning displays, diagnostic lights and codes, and fastening and mounting devices; by: visually inspecting, testing, and analysing performance and function, using hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

U5193.0 ELECTRICAL AND ELECTRONIC CONTROLS - Contd.

5193.05 **Diagnose and troubleshoot electronically-controlled systems and components**, including: switches, relays, controls, actuators, warning devices, sensors, modules, wiring harnesses, data links, diagnostic lights, and fastening and mounting devices, by visually inspecting, testing, and analysing performance and function, checking for: shorts/opens/grounds, colour, odour, temperature, corrosion, vibration/noise, diagnostic codes, malfunction indicator lights, system voltage, and data re-programming, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, schematic diagrams, and safety requirements. .

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5193.06 **Repair electronically-controlled systems and components**, including: switches, relays, controls, actuators, warning devices, sensors, modules, wiring harnesses, data links, diagnostic lights, and fastening and mounting devices, by: exchanging, reconditioning, or servicing, using hand, power, specialized, and electronic service tools and lifting, rigging and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5193.07 **Verify repair of electronically-controlled systems and components**, including: switches, relays, controls, actuators, warning devices, sensors, modules, wiring harnesses, data links, diagnostic lights, and fastening and mounting devices, by visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

Employer/Sponsor Name	Employer/Sponsor Signature
_____	_____

U5194.0 TRANSMISSION OIL COOLERS

GENERAL PERFORMANCE OBJECTIVE

Diagnose and repair transmission oil coolers, by: performing a visual inspection; diagnosing and troubleshooting transmission oil coolers and components; repairing transmission oil coolers and components, and verifying repair of transmission oil coolers and components; according to manufacturer's recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5194.01 **Perform visual inspection**, identifying system type and application, by: checking for worn, loose, damaged, leaking, or missing components, including: lines, hoses, fittings, seals, coolers (oil- to-air), filters, fluids/lubricants, and level indicators, and fastening and mounting devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

5194.02 **Diagnose and troubleshoot transmission oil coolers and components**, including: oil cooler assemblies, lines, hoses, fittings, seals, fluids/lubricants, level indicators, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, checking for: temperature, corrosion, contamination, vibration/noise, odour, colour, oil level/condition; using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed

Trainer Signature

Apprentice Signature

U5194.0 TRANSMISSION OIL COOLERS - Contd.

5194.03 **Repair transmission oil coolers and components**, including: oil cooler assemblies, lines, hoses, fittings, seals, fluids/lubricants, level indicators, and fastening and mounting devices, by: exchanging and servicing, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5194.04 **Verify repair of transmission oil coolers and components**, including: oil cooler assemblies, lines, hoses, fittings, seals, fluids/lubricants, level indicators, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

Employer/Sponsor Name	Employer/Sponsor Signature
_____	_____

U5195.0 TRANSFER CASES

GENERAL PERFORMANCE OBJECTIVES

Diagnose and repair transfer cases, by: performing a visual inspection; diagnosing and troubleshooting transfer cases and components; repairing transfer cases and components, and verifying repair of transfer cases and components; according to manufacturer’s recommendations, specifications, and safety requirements.

PERFORMANCE OBJECTIVES

SKILLS

5195.01 **Performs visual inspection**, identifying system type and application, by: checking for: worn, loose, damaged, leaking, missing, or defective components, including: housings, linkages, bearings, seals, gear trains, locking devices, viscous couplings, lubrication systems, diagnostic codes, indicator lights, warning devices, relays, solenoids, controls, actuators, sensors, modules, wiring harnesses, information/warning displays, data links, and fastening and mounting devices; according to manufacturer’s recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5195.02 **Diagnose and troubleshoot transfer cases and components**, including: housings, linkages, bearings, seals, gear trains, locking devices, viscous couplings, lubrication systems, diagnostic codes, indicator lights, warning devices, relays, solenoids, controls, actuators, sensors, modules, wiring harnesses, information/warning displays, data links, and fastening and mounting devices, by visually inspecting, testing, and analyzing performance and function, checking for: temperature, odour, colour, vibration/noise, leaks, fractures and corrosion; using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

U5195.0 TRANSFER CASES - Contd.

5195.03 **Repair transfer cases and components**, including: housings, linkages, bearings, seals, gear trains, locking devices, viscous couplings, lubrication systems, diagnostic codes, indicator lights, warning devices, relays, solenoids, controls, actuators, sensors, modules, wiring harnesses, information/warning displays, data links, and fastening and mounting devices, by: exchanging, reconditioning, or servicing; using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

5195.04 **Verify repair of transfer cases and components**, including: housings, linkages, bearings, seals, gear trains, locking devices, viscous couplings, lubrication systems, diagnostic codes, indicator lights, warning devices, relays, solenoids, controls, actuators, sensors, modules, wiring harnesses, information/warning displays, data links, and fastening and mounting devices, by: visually inspecting, testing, and analyzing performance and function, using: hand, power, specialized, and electronic service tools and lifting, rigging, and blocking devices; according to manufacturer's recommendations, specifications, and safety requirements.

Date Completed	Trainer Signature	Apprentice Signature
_____	_____	_____

Employer/Sponsor Name	Employer/Sponsor Signature
_____	_____