

HEAVY EQUIPMENT TECHNICIAN (Off – Road)

**NATIONAL OCCUPATIONAL ANALYSIS (2004)
Integrated With
INDIVIDUALIZED LEARNING MODULES**

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Alberta



Apprenticeship and
Industry Training

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DOCUMENT DESCRIPTION

Tasks that are performed by skilled workers in this trade across Canada.

Block: A group of related tasks.

This number indicates the percentage of exam questions on the topic.

A → OCCUPATIONAL SKILLS → 17%

I → USES TOOLS, EQUIPMENT AND MATERIAL →

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
1.01	Uses hand tools	<ul style="list-style-type: none"> •→ ability to use measuring and layout tools (tapes, rules, squares, dividers, sliding T bevel, protractor, trammel points, callipers) •→ ability to sharpen and maintain tools •→ ability to use cutting tools (saws, files, rasps) •→ ability to use fastening tools (hammers, wrenches, screwdrivers, staplers) •→ ability to use hand chisels and planes •→ ability to use hand drills •→ ability to use abrading tools (sandpaper) •→ ability to use dismantling tools (nail pullers, wrecking bars) 	020103a	Hand Tools

Subtask Number

Small divisions, when combined, describe the duties constituting a task.

The essential skills and knowledge required to perform the task and subtask.

Module name and number where information is available on the subtask/enabling objective.

A OCCUPATIONAL SKILLS

10%

1 USES TOOLS AND EQUIPMENT

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
1.01	Uses hand tools, power tools and equipment	<ul style="list-style-type: none">• knowledge of types of tools such as hand tools and power tools• knowledge of applications of tools and equipment• ability to select tools and equipment• ability to operate tools and equipment• ability to maintain tools and equipment• ability to store tools and equipment	190101c 190101d	Materials and Fastening Devices Hand, Shop and Power Tools
1.02	Uses measuring and testing devices	<ul style="list-style-type: none">• knowledge of types of tools such as gauges, meters and precision tools• knowledge of installation procedures for measuring and testing devices• ability to verify calibration of measuring and testing devices• ability to select measuring and testing	190101e 190201c	Measuring Tools Engine Block & Cylinder Liner Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		devices <ul style="list-style-type: none"> • ability to use measuring and testing devices • ability to store measuring and testing devices 		
1.03	Uses hoisting and lifting equipment	<ul style="list-style-type: none"> • knowledge of rigging techniques and material • knowledge of rigging equipment • knowledge of capacity and limitations of lifting equipment • knowledge of component weight • knowledge of blocking and cribbing procedures • ability to select rigging equipment • ability to attach rigging equipment to component • ability to operate equipment • ability to use hand signals • ability to block and crib components 	190101b 190201a	Lifting Procedures and Wire Rope Engine Fundamentals And On The Job Training

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>and equipment</p> <ul style="list-style-type: none"> • ability to maintain equipment according to manufacturers' specifications 		
1.04	Uses welding equipment	<ul style="list-style-type: none"> • knowledge of types of metals • knowledge of government regulations • knowledge of repair limitations of specific components such as Roll-Over Protective Structure (ROPS), Falling Object Protective Structure (FOPS) and pressure vessels • knowledge of basic welding practices (nonstructural) • ability to prepare machine or component prior to welding using procedures such as blocking, cribbing and disconnecting batteries • ability to select materials such as welding rods • ability to operate welding equipment (GMAW, GTAW, SMAW) • ability to perform non-structural 	<p style="text-align: center;"><u>Welding</u></p> <p style="text-align: center;">120101b</p> <p style="text-align: center;"><u>Automotive Service</u></p> <p style="text-align: center;">090102b</p>	<p style="text-align: center;"><u>Modules</u></p> <p style="text-align: center;">Safety Guidelines</p> <p style="text-align: center;"><u>Technician Modules</u></p> <p style="text-align: center;">Gas Metal Arc Welding (GMAW) (MIG Welding)</p> <p style="text-align: center;"><i>Other modules available in Welding Modules</i></p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		welding <ul style="list-style-type: none"> • ability to store welding equipment and materials 		
1.05	Uses cutting equipment	<ul style="list-style-type: none"> • knowledge of safe handling procedures for cylinders • knowledge of cutting equipment such as gas, plasma and arc/air • knowledge of types of gasses such as acetylene and propane • knowledge of types of metal • ability to set up, operate and shut down cutting equipment • ability to select and adjust gas pressures • ability to maintain cutting equipment such as torch tips and plasma cutters 	190101f	Oxy-Fuel Equipment, Heating and Cutting
1.06	Uses heating/cooling equipment	<ul style="list-style-type: none"> • knowledge of types of component heating equipment • knowledge of types of component cooling equipment 	190101f	Oxy-Fuel Equipment, Heating and Cutting

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of risks associated with heating equipment • knowledge of types of heating fuels such as propane and acetylene • ability to select accessories • ability to set up heating equipment • ability to set up cooling equipment • ability to maintain heating equipment • ability to maintain cooling equipment • ability to heat components • ability to cool components • ability to store equipment 		
1.07	Uses cleaning equipment and agents	<ul style="list-style-type: none"> • knowledge of types of cleaning equipment • knowledge of types of cleaning agents • knowledge of safe handling, storage and disposal of cleaning agents • knowledge of safe handling, storage 	190201a	Engine Fundamentals And On The Job Training

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>and disposal of waste</p> <ul style="list-style-type: none"> • ability to select and operate cleaning equipment • ability to select agent • ability to maintain cleaning equipment • ability to handle, store and dispose of cleaning agents • ability to handle, store and dispose of waste 		

2 PERFORMS MAINTENANCE AND INSPECTIONS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
2.01	Maintains fuels, lubricants and coolants	<ul style="list-style-type: none"> • knowledge of types of fluids such as engine, drive train and hydraulic • knowledge of fluid ratings such as viscosity and quality • knowledge of handling, storage and disposal procedures and regulations 	<p>190201a</p> <p>190102h</p> <p>190405c</p> <p>190202dA</p>	<p>Engine Fundamentals</p> <p>Preventative Maintenance</p> <p>Failure & Fluid Analysis</p> <p>Cooling Systems (Liquid & Air) – Part A</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of fluids and filter change procedures • knowledge of filter ratings • knowledge of fluid sample analysis • ability to determine service intervals of fluids and filters • ability to perform scheduled fluid sampling • ability to change fluids and filters • ability to select fluids, additives, concentrations and filters • ability to determine compatibility of various fluids • ability to handle, store and dispose of fluids and filters 	190202dB	Cooling Systems (Liquid & Air) – Part B And On The Job Training
2.02	Services fasteners, sealing devices, adhesives and gaskets	<ul style="list-style-type: none"> • knowledge of imperial and metric measuring systems • knowledge of types of fasteners • knowledge of grades of fasteners 	190101c	Materials and Fastening Devices

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of torque specifications • knowledge of different tightening methods • knowledge of types of sealing devices such as gaskets, o-rings and packing • knowledge of types of adhesives • knowledge of installation procedures of fasteners, sealing devices and adhesives • ability to select fasteners, sealing devices and adhesives • ability to inspect and repair threads • ability to install fasteners • ability to make gaskets • ability to install sealing devices, gaskets and adhesives 		
2.03	Services hoses, tubing and fittings	<ul style="list-style-type: none"> • knowledge of types of hoses, tubing and fittings • knowledge of rating and applications of hoses, tubing and fittings 	190105aA 190105aB 190105b	Hydraulic Fundamentals – Part A Hydraulic Fundamentals – Part A Hydraulic System Components: Reservoir, Filters and Coolers

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to select hoses, fittings and adapters • ability to assemble hoses, tubing and fittings • ability to use crimping tools and dies • ability to use hand and power operated bending equipment 	190105c	Hydraulic System Components: Valves, Cylinders and Accumulators
2.04	Services bearings and seals	<ul style="list-style-type: none"> • knowledge of bearing types and materials such as ball, tapered, roller and plain or sleeve • knowledge of seal types such as o-ring, lip, ring, face, static and dynamic • knowledge of seal materials such as neoprene and nitrile • knowledge of removal and installation methods for bearings and seals • ability to diagnose failures of bearings and seals • ability to select tools for removal and installation 	190102c	Bearings and Seals

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to remove and install bearings and seals according to manufacturers' specifications • ability to inspect bearings for wear and reusability 		
2.05	Services safety features	<ul style="list-style-type: none"> • knowledge of types of safety features such as lighting and warning devices, fire suppression systems, lock-out bars and operator access features • knowledge of operation of safety features • knowledge of government regulations such as ROPS and FOPS • knowledge of mechanical lock-out systems • knowledge of audible or visual warning systems/devices • ability to test and verify operation of safety features • ability to arm and disarm fire suppression systems 	<p>190302cA</p> <p>190302cB</p> <p>190302d</p> <p>190302e</p>	<p>Off Road Equipment Accessories and Attachments – Part A</p> <p>Off Road Equipment Accessories and Attachments – Part A</p> <p>Off Road Electrical Circuit Fundamentals</p> <p>Off Road Electrical Circuit Service</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> ability to inspect and report defects of safety features 		
2.06	Performs scheduled maintenance procedures	<ul style="list-style-type: none"> knowledge of manufacturers' service recommendations knowledge of in-house preventative maintenance requirements knowledge of warranty requirements ability to interpret maintenance schedules ability to modify maintenance schedule according to operating environment ability to service machine according to maintenance schedule 	190102h 190405c	Preventative Maintenance Failure & Fluid Analysis And On The Job Training
2.07	Performs operational check-out	<ul style="list-style-type: none"> knowledge of machine operation and controls knowledge of licensing requirements knowledge of equipment and component limitations knowledge of pre-start and walk around inspection 	190102h 190405c 190405d 190102fA 190102fB	Preventative Maintenance Failure & Fluid Analysis Orientation to Vehicle Inspection Coupling Units and Landing Gear Fundamentals and Service – Part A Coupling Units and Landing Gear Fundamentals and Service – Part B

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of parking and shut-down procedures • ability to perform basic operation of machine and components • ability to record and report non-conformities 	190102g	Orientation to Trailer Inspection
2.08	Performs return to service check	<ul style="list-style-type: none"> • ability to perform a walk around inspection • ability to cycle machine to confirm all systems function to specifications • ability to verify that dimensions/pressures are correct according to specifications • ability to advise operator of follow-up procedures required (i.e. re-torques) 	190102h 190405c 190405d 190102fA 190102fB 190102g	Preventative Maintenance Failure & Fluid Analysis Orientation to Vehicle Inspection Coupling Units and Landing Gear Fundamentals and Service – Part A Coupling Units and Landing Gear Fundamentals and Service – Part B Orientation to Trailer Inspection

3 ANALYSES AND PROCESSES INFORMATION

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
3.01	Diagnoses operational faults	<ul style="list-style-type: none"> • knowledge of machine and system operation and limitations • knowledge of diagnostic testing techniques • ability to verify customer/operator complaint • ability to assess operating conditions • ability to cycle machine • ability to apply diagnostic testing techniques • ability to isolate system fault • ability to determine root cause of failure 		Considered On The Job Training
3.02	Accesses service information	<ul style="list-style-type: none"> • knowledge of types of service information • knowledge of technical service bulletins (updates) • knowledge of on-board diagnostic 	<p>190204c</p> <p>190204b</p>	<p>Performance Analysis & Tune-up</p> <p>Electronically Controlled Fuel Injection Systems</p> <p>And On the Job Training</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>systems</p> <ul style="list-style-type: none"> • knowledge of schematic types and function • knowledge of factory support • knowledge of data storage and transfer methods • ability to store and transfer electronic data • ability to access and document information using computer software and the Internet • ability to access information using printed matter • ability to follow diagnostic and troubleshooting flow charts • ability to interpret data • ability to interpret drawings and specifications 		
3.03	Abides by regulations and	<ul style="list-style-type: none"> • knowledge of government regulations and industry and company standards 		Considered On The Job Training

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
	standards	<ul style="list-style-type: none"> • knowledge of personal and company liability • ability to access regulations and standards • ability to follow regulations and standards 		
3.04	Prepares/completes service related documents	<ul style="list-style-type: none"> • knowledge of types of service related documents • ability to requisition parts • ability to prepare timesheets • ability to estimate how long a repair will take • ability to provide documentation for work orders • ability to provide documentation for warranties • ability to provide documentation for service records 		Considered On The Job Training

B ENGINES AND ENGINE SUPPORT SYSTEMS**18%****4 DIAGNOSES ENGINES AND ENGINE SUPPORT SYSTEMS**

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
4.01	Diagnoses engine performance	<ul style="list-style-type: none">• knowledge of operational test methods such as load, no-load and governed speeds• knowledge of manufacturers' engine ratings• ability to complete sensory inspection• ability to perform and interpret tests such as pressure, temperature and vibration• ability to use diagnostic tools and equipment	190201a 190201b 190201c 190201d 190201e 190201f 190201g 190201h 190201i	Engine Fundamentals Engine Block & Cylinder Liner Fundamentals Engine Block & Cylinder Liner Service Piston, Piston Rings & Connecting Rod Fundamentals Piston, Piston Rings & Connecting Rod Service Crankshaft, Bearings and Related Component Fundamentals Crankshaft, Bearings and Related Component Service Camshaft & Follower Fundamentals Camshaft & Follower Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			190201j	Cylinder Head Fundamentals
			190201kA	Cylinder Head Service – Part A
			190201kB	Cylinder Head Service – Part B
			190201L	Engine Braking System Fundamentals & Service
4.02	Diagnoses basic engine	<ul style="list-style-type: none"> • knowledge of engine types and operation • knowledge of engine components • knowledge of engine specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret engine tests 	190201a 190201b 190201c 190201d 190201e 190201f 190201g 190201h	Engine Fundamentals Engine Block & Cylinder Liner Fundamentals Engine Block & Cylinder Liner Service Piston, Piston Rings & Connecting Rod Fundamentals Piston, Piston Rings & Connecting Rod Service Crankshaft, Bearings and Related Component Fundamentals Crankshaft, Bearings and Related Component Service Camshaft & Follower Fundamentals

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			190201i	Camshaft & Follower Service
			190201j	Cylinder Head Fundamentals
			190201kA	Cylinder Head Service – Part A
			190201kB	Cylinder Head Service – Part B
			190201L	Engine Braking System Fundamentals & Service
4.03	Diagnoses lubrication systems	<ul style="list-style-type: none"> • knowledge of lubrication system types and operation • knowledge of lubrication system components • knowledge of lubrication system specifications • knowledge of viscosity and quality of fluids • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools 	190202c	Lubrication systems & Crankcase Ventilation

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to perform and interpret lubrication system tests • ability to perform leak diagnoses (internal or external) 		
4.04	Diagnoses cooling systems	<ul style="list-style-type: none"> • knowledge of cooling system types and operation • knowledge of cooling system components • knowledge of cooling system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret cooling system tests • ability to perform leak diagnoses (internal or external) 	<p>190202dA</p> <p>190202dB</p>	<p>Cooling Systems (Liquid & Air) – Part A</p> <p>Cooling Systems (Liquid & Air) – Part B</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
4.05	Diagnoses intake and exhaust systems	<ul style="list-style-type: none"> • knowledge of intake and exhaust system types and operation • knowledge of intake and exhaust system components • knowledge of intake and exhaust systems specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret intake and exhaust system tests 	<p>190202a</p> <p>190202b</p>	<p>Air Induction & Exhaust Systems</p> <p>Turbocharged Air Systems</p>
4.06	Diagnoses fuel systems	<ul style="list-style-type: none"> • knowledge of fuel system types and operation • knowledge of fuel system components • knowledge of fuel system specifications • knowledge of diagnostic tools 	<p>190203a</p> <p>190203b</p> <p>190203c</p> <p>190203d</p>	<p>Diesel Fuel & Storage Tanks (Machine and Bulk Storage)</p> <p>Combustion Process & Starting Aids</p> <p>Basic Fuel Injection System</p> <p>Fuel system Service</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret fuel system tests 	190203e 190203f 190203g 190203h 190203i	Port/Helix Metering Fuel System Opposed Plunger Inlet Fuel Metering system Diesel Fuel Injector Fundamentals & Service Engine Governor fundamentals and Service Emergency Shut-down Systems
			<u>Automotive Service</u>	<u>Technician Modules</u>
			090302a	Fuel Properties
			090302b	Combustion & Exhaust Emissions
			090302c	Exhaust Gas Analysis
			090304a	Fuel Tanks & Supply Systems
			090304b	Gasoline Fuel Injection System Fundamentals
			090304c	Gasoline Electronic Fuel Injection Systems

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			090304d	Gasoline Fuel Injection system Diagnosis and Service
4.07	Diagnoses engine control systems	<ul style="list-style-type: none"> • knowledge of engine control system types and operation • knowledge of engine control system components • knowledge of engine control system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret engine control system tests 	190405a 190405b 190302cA 190302cB 190302d 190302e	Truck Electrical Circuit Fundamentals Truck Electrical Circuit Service Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part B Off Road Electrical Circuit Fundamentals Off Road Electrical Circuit Service

5 REPAIRS ENGINES AND ENGINE SUPPORT SYSTEMS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
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	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
5.01	Repairs basic engines	<ul style="list-style-type: none"> • knowledge of engine components • knowledge of procedures to remove engine and engine components • knowledge of procedures to disassemble engine and engine components • knowledge of procedures to assemble engine and engine components • knowledge of procedures to install engine and engine components • knowledge of manufacturers' specifications • knowledge of start-up procedures • knowledge of break-in procedures • ability to remove engine and engine components • ability to disassemble engine and engine components • ability to determine reusability of engine and engine components 	<p>190201a</p> <p>190201b</p> <p>190201c</p> <p>190201d</p> <p>190201e</p> <p>190201f</p> <p>190201g</p> <p>190201h</p> <p>190201i</p> <p>190201j</p> <p>190201kA</p> <p>190201kB</p>	<p>Engine Fundamentals</p> <p>Engine Block & Cylinder Liner Fundamentals</p> <p>Engine Block & Cylinder Liner Service</p> <p>Piston, Piston Rings & Connecting Rod Fundamentals</p> <p>Piston, Piston Rings & Connecting Rod Service</p> <p>Crankshaft, Bearings and Related Component Fundamentals</p> <p>Crankshaft, Bearings and Related Component Service</p> <p>Camshaft & Follower Fundamentals</p> <p>Camshaft & Follower Service</p> <p>Cylinder Head Fundamentals</p> <p>Cylinder Head Service – Part A</p> <p>Cylinder Head Service – Part B</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to recondition engine and engine components • ability to assemble engine and engine components • ability to install engine and engine components • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 	190201L	Engine Braking System Fundamentals & Service
5.02	Repairs lubrication systems	<ul style="list-style-type: none"> • knowledge of lubrication system components • knowledge of procedures to remove lubrication system components • knowledge of procedures to disassemble lubrication system components • knowledge of procedures to assemble lubrication system components • knowledge of procedures to install lubrication system components 	190202c	Lubrication systems & Crankcase Ventilation

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of manufacturers' specifications • knowledge of start-up procedures • ability to remove lubrication system components • ability to disassemble lubrication system components • ability to determine reusability of lubrication system components • ability to recondition lubrication system components • ability to assemble lubrication system components • ability to install lubrication system components • ability to perform start-up procedures • ability to perform final adjustments 		
5.03	Repairs cooling systems	<ul style="list-style-type: none"> • knowledge of cooling system components 	190202dA	Cooling Systems (Liquid & Air) – Part A Cooling Systems (Liquid & Air) –

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of procedures to remove cooling system components • knowledge of procedures to disassemble cooling system components • knowledge of procedures to assemble cooling system components • knowledge of procedures to install cooling system components • knowledge of manufacturers' specifications • knowledge of start-up procedures • ability to remove cooling system components • ability to disassemble cooling system components • ability to determine reusability of cooling system components • ability to recondition cooling system components 	190202dB	Part B

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to assemble cooling system components • ability to install cooling system components • ability to perform start-up procedures • ability to perform final adjustments 		
5.04	Repairs intake and exhaust systems	<ul style="list-style-type: none"> • knowledge of intake and exhaust system components • knowledge of procedures to remove intake and exhaust system components • knowledge of procedures to disassemble intake and exhaust system components • knowledge of procedures to assemble intake and exhaust system components • knowledge of procedures to install intake and exhaust system components • knowledge of manufacturers' specifications • knowledge of start-up procedures 	<p>190202a</p> <p>190202b</p>	<p>Air Induction & Exhaust Systems</p> <p>Turbocharged Air Systems</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to remove intake and exhaust system components • ability to disassemble intake and exhaust system components • ability to determine reusability of intake and exhaust system components • ability to recondition intake and exhaust system components • ability to assemble intake and exhaust system components • ability to install intake and exhaust system components • ability to perform start-up procedures • ability to perform final adjustments 		
5.05	Repairs fuel systems	<ul style="list-style-type: none"> • knowledge of fuel system components • knowledge of procedures to remove fuel system components • knowledge of procedures to disassemble fuel system components 	<p>190203a</p> <p>190203b</p> <p>190203c</p>	<p>Diesel Fuel & Storage Tanks (Machine and Bulk Storage)</p> <p>Combustion Process & Starting Aids</p> <p>Basic Fuel Injection System</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> knowledge of procedures to assemble fuel system components 	190203d	Fuel system Service
			190203e	Port/Helix Metering Fuel System
		<ul style="list-style-type: none"> knowledge of procedures to install fuel system components 	190203f	Opposed Plunger Inlet Fuel Metering system
		<ul style="list-style-type: none"> knowledge of manufacturers' specifications 	190203g	Diesel Fuel Injector Fundamentals & Service
		<ul style="list-style-type: none"> knowledge of start-up procedures 	190203h	Engine Governor fundamentals and Service
		<ul style="list-style-type: none"> ability to remove fuel system components 	190203i	Emergency Shut-down Systems
		<ul style="list-style-type: none"> ability to disassemble fuel system components 		
		<ul style="list-style-type: none"> ability to determine reusability of fuel system components 	<u>Automotive Service</u>	<u>Technician Modules</u>
			090302a	Fuel Properties
		<ul style="list-style-type: none"> ability to recondition fuel system components 	090302b	Combustion & Exhaust Emissions
			090302c	Exhaust Gas Analysis
		<ul style="list-style-type: none"> ability to assemble fuel system components 	090304a	Fuel Tanks & Supply Systems
		<ul style="list-style-type: none"> ability to install fuel system components 	090304b	Gasoline Fuel Injection System Fundamentals
		<ul style="list-style-type: none"> ability to perform start-up procedures 	090304c	Gasoline Electronic Fuel Injection

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> ability to perform final adjustments 	090304d	Systems Gasoline Fuel Injection system Diagnosis and Service
5.06	Repairs engine control systems	<ul style="list-style-type: none"> knowledge of engine control system components knowledge of procedures to remove engine control system components knowledge of procedures to disassemble engine control system components knowledge of procedures to assemble engine control system components knowledge of procedures to install engine control system components knowledge of manufacturers' specifications knowledge of procedures for programming and calibrating controllers ability to remove engine control system components 	190405a 190405b 190302cA 190302cB 190302d 190302e	Truck Electrical Circuit Fundamentals Truck Electrical Circuit Service Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part B Off Road Electrical Circuit Fundamentals Off Road Electrical Circuit Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to disassemble components of engine control systems • ability to determine reusability of engine control system components • ability to recondition engine control system components • ability to assemble engine control system components • ability to install engine control system components • ability to perform final adjustments • ability to program and calibrate controllers 		
5.07	Verifies repair of engine and engine support systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional 		<i>See 5.01 – 5.06</i>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		corrective action is required		

C HYDRAULIC AND PNEUMATIC SYSTEMS

17%

6 DIAGNOSES HYDRAULIC AND PNEUMATIC SYSTEMS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
6.01	Diagnoses hydraulic systems	<ul style="list-style-type: none">• knowledge of hydraulic system types and operation• knowledge of hydraulic system components• knowledge of hydraulic system specifications• knowledge of diagnostic tools• knowledge of diagnostic testing procedures• ability to complete sensory inspection• ability to use diagnostic tools• ability to perform and interpret hydraulic system tests	190301b 190301c 190301d 190301e 190301fA 190301fB 190301g 190301h 190301i	Hydraulic Pump Fundamentals Hydraulic Pump Service Hydraulic Actuator Fundamentals Hydraulic Actuator Service Hydraulic Valves – Part A Hydraulic Valves – Part B Hydraulic system Types Hydraulic System Testing & Service Electro-Hydraulics
6.02	Diagnoses hydrostatic systems	<ul style="list-style-type: none">• knowledge of hydrostatic system types and operation	190301fA 190301fB	Hydraulic Valves – Part A Hydraulic Valves – Part B

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of hydrostatic system components • knowledge of hydrostatic system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret hydrostatic system tests 	190105c	Hydraulic System Components: Pumps, Valves, Cylinders and Actuators
6.03	Diagnoses pneumatic systems	<ul style="list-style-type: none"> • knowledge of pneumatic system types and operation • knowledge of pneumatic system components • knowledge of pneumatic system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing 	<u>Millwright</u> 160301h 160311a 160205aA 160205aB 160205bA 160205bB	<u>Modules</u> Pneumatic Systems Hydraulic and Pneumatic Systems Compressor Fundamentals – Part A Compressor Fundamentals – Part B Repair of Compressor Stationary Components – Part A Repair of Compressor Stationary

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		procedures <ul style="list-style-type: none"> • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret pneumatic system tests 	160205cA 160205cB 160205d 160205e 160205f	Components – Part B Repair of Compressor Moving Components – Part A Repair of Compressor Moving Components – Part B Repair of Compressor Valves and Gas Sealing Compressor Servicing Compressor Overhaul and Start-Up Procedures

7 REPAIRS HYDRAULIC AND PNEUMATIC SYSTEMS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
7.01	Repairs hydraulic systems	<ul style="list-style-type: none"> • knowledge of hydraulic system components • knowledge of procedures to remove hydraulic system components • knowledge of procedures to disassemble hydraulic system 	190301b 190301c 190301d 190301e	Hydraulic Pump Fundamentals Hydraulic Pump Service Hydraulic Actuator Fundamentals Hydraulic Actuator Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> components • knowledge of procedures to assemble hydraulic system components • knowledge of procedures to install hydraulic system components • knowledge of manufacturers' specifications • knowledge of start-up procedures • knowledge of break-in procedures • ability to remove hydraulic system components • ability to disassemble hydraulic system components • ability to determine reusability of hydraulic system components • ability to recondition hydraulic system components • ability to assemble hydraulic system components • ability to install hydraulic system 	<p>190301fA</p> <p>190301fB</p> <p>190301g</p> <p>190301h</p> <p>190301i</p>	<p>Hydraulic Valves – Part A</p> <p>Hydraulic Valves – Part B</p> <p>Hydraulic system Types</p> <p>Hydraulic System Testing & Service</p> <p>Electro-Hydraulics</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		components <ul style="list-style-type: none"> • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 		
7.02	Repairs hydrostatic systems	<ul style="list-style-type: none"> • knowledge of hydrostatic system components • knowledge of procedures to remove hydrostatic system components • knowledge of procedures to disassemble hydrostatic system components • knowledge of procedures to assemble hydrostatic system components • knowledge of procedures to install hydrostatic system components • knowledge of manufacturers' specifications • knowledge of start-up procedures • knowledge of break-in procedures 	190301fA 190301fB 190105c	Hydraulic Valves – Part A Hydraulic Valves – Part B Hydraulic System Components: Pumps, Valves, Cylinders and Actuators

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to remove hydrostatic system components • ability to disassemble hydrostatic system components • ability to determine reusability of hydrostatic system components • ability to recondition hydrostatic system components • ability to assemble hydrostatic system components • ability to install hydrostatic system components • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 		
7.03	Repairs pneumatic systems	<ul style="list-style-type: none"> • knowledge of pneumatic system components • knowledge of procedures to remove pneumatic system components 	<u>Millwright</u> 160301h 160311a 160205aA	<u>Modules</u> Pneumatic Systems Hydraulic and Pneumatic Systems Compressor Fundamentals – Part A

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of procedures to disassemble pneumatic system components 	160205aB	Compressor Fundamentals – Part B
		<ul style="list-style-type: none"> • knowledge of procedures to assemble pneumatic system components 	160205bA	Repair of Compressor Stationary Components – Part A
		<ul style="list-style-type: none"> • knowledge of procedures to install pneumatic system components 	160205bB	Repair of Compressor Stationary Components – Part B
		<ul style="list-style-type: none"> • knowledge of manufacturers’ specifications 	160205cA	Repair of Compressor Moving Components – Part A
		<ul style="list-style-type: none"> • knowledge of start-up procedures 	160205cB	Repair of Compressor Moving Components – Part B
		<ul style="list-style-type: none"> • knowledge of break-in procedures 	160205d	Repair of Compressor Valves and Gas Sealing
		<ul style="list-style-type: none"> • ability to remove pneumatic system components 	160205e	Compressor Servicing
		<ul style="list-style-type: none"> • ability to disassemble pneumatic system components 	160205f	Compressor Overhaul and Start-Up Procedures
		<ul style="list-style-type: none"> • ability to determine reusability of pneumatic system components 		
		<ul style="list-style-type: none"> • ability to recondition pneumatic system components 		
		<ul style="list-style-type: none"> • ability to assemble pneumatic system 		

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		components <ul style="list-style-type: none"> • ability to install pneumatic system components • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 		
7.04	Verifies repair of hydraulic, hydrostatic and pneumatic systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	190301b 190301c 190301d 190301e 190301fA 190301fB 190301g 190301h 190301i 190301fA	Hydraulic Pump Fundamentals Hydraulic Pump Service Hydraulic Actuator Fundamentals Hydraulic Actuator Service Hydraulic Valves – Part A Hydraulic Valves – Part B Hydraulic system Types Hydraulic System Testing & Service Electro-Hydraulics Hydraulic Valves – Part A

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			190301fB	Hydraulic Valves – Part B
			190105c	Hydraulic System Components: Pumps, Valves, Cylinders and Actuators
			<u>Millwright</u>	<u>Modules</u>
			160301h	Pneumatic Systems
			160311a	Hydraulic and Pneumatic Systems
			160205aA	Compressor Fundamentals – Part A
			160205aB	Compressor Fundamentals – Part B
			160205bA	Repair of Compressor Stationary Components – Part A
			160205bB	Repair of Compressor Stationary Components – Part B
			160205cA	Repair of Compressor Moving Components – Part A
			160205cB	Repair of Compressor Moving Components – Part B
			160205d	Repair of Compressor Valves and Gas Sealing

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			160205e	Compressor Servicing
			160205f	Compressor Overhaul and Start-Up Procedures

D DRIVE TRAIN**15%****8 DIAGNOSES DRIVE TRAINS**

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
8.01	Diagnoses clutch systems	<ul style="list-style-type: none">• knowledge of clutch system types and operation• knowledge of clutch system components• knowledge of system specifications• knowledge of diagnostic tools• knowledge of diagnostic testing procedures• ability to complete sensory inspection• ability to use diagnostic tools• ability to perform and interpret clutch system tests	190401b 190303k	Driveline Fundamentals & Service Clutch Fundamentals & Service
8.02	Diagnoses torque converters, fluid couplers and	<ul style="list-style-type: none">• knowledge of types of torque converters, fluid couplers and retarders and their operation	190303b 190303e	Torque Converter Fundamentals and Service Hydraulic Retarder Fundamentals

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
	retarders	<ul style="list-style-type: none"> • knowledge of torque converter, fluid coupler and retarder components • knowledge of torque converter, fluid coupler and retarder system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret torque converter, fluid coupler and retarder tests 		And On-The Job Training
8.03	Diagnoses driveline systems	<ul style="list-style-type: none"> • knowledge of driveline system types and operation • knowledge of driveline system components • knowledge of driveline system specifications, including alignment and phasing 	<p>190303i</p> <p>190303jA</p> <p>190303jB</p>	<p>Final Drive Fundamentals & Service (Off Road)</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part A</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part B</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret driveline system tests 		
8.04	Diagnoses transmission and transfer case systems	<ul style="list-style-type: none"> • knowledge of transmission and transfer case system types and operation • knowledge of transmission and transfer case system components • knowledge of transmission and transfer case system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret 	<p>190401c</p> <p>190401dA</p> <p>190401dB</p> <p>190401e</p> <p>190401f</p> <p>190401g</p> <p>190303c</p> <p>190303d</p>	<p>Gearing Principles</p> <p>Transmission Fundamentals – Part A</p> <p>Transmission Fundamentals – Part B</p> <p>Transmission Shifting</p> <p>Transmission Service</p> <p>Transfer Case & Auxiliary Devices</p> <p>Powershift & Automatic Transmission Mechanical/Electrical Components</p> <p>Powershift and Automatic</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		transmission and transfer case system tests	190303f 190401g	Transmission Control & Shifting Powershift & Automatic Transmission Testing & Service Transfer Case & Auxiliary Drives
8.05	Diagnoses axle and differential systems	<ul style="list-style-type: none"> • knowledge of axle and differential system types and operation • knowledge of axle and differential system components such as spur gear and planetary gear reduction • knowledge of axle and differential system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret axle and differential system tests 	190303i 190303jA 190303jB	Final Drive Fundamentals & Service (Off Road) Drive Axle and Carrier Fundamentals and Service (Off-Road) Part A Drive Axle and Carrier Fundamentals and Service (Off-Road) Part B
8.06	Diagnoses final drive systems	<ul style="list-style-type: none"> • knowledge of final drive system types and operation 	190303i	Final Drive Fundamentals & Service (Off Road)

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of final drive system components • knowledge of final drive system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret final drive system tests 	<p>190303jA</p> <p>190303jB</p>	<p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part A</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part B</p>

9 REPAIRS DRIVE TRAINS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
9.01	Repairs clutch systems	<ul style="list-style-type: none"> • knowledge of clutch system components • knowledge of procedures to remove clutch system components 	<p>190401b</p> <p>190303k</p>	<p>Driveline Fundamentals & Service</p> <p>Clutch Fundamentals & Service</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of procedures to disassemble clutch system components • knowledge of procedures to assemble clutch system components • knowledge of procedures to install clutch system components • knowledge of manufacturers' specifications • knowledge of start-up procedures • knowledge of break-in procedures • ability to remove clutch system components • ability to disassemble clutch system components • ability to determine reusability of clutch system components • ability to recondition clutch system components • ability to assemble clutch system components 		

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to install clutch system components • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 		
9.02	Repairs torque converters, fluid couplers and retarders	<ul style="list-style-type: none"> • knowledge of torque converter, fluid coupler and retarder components • knowledge of procedures to remove torque converter, fluid coupler and retarder components • knowledge of procedures to disassemble torque converter, fluid coupler and retarder components • knowledge of procedures to assemble torque converter, fluid coupler and retarder components • knowledge of procedures to install torque converter, fluid coupler and retarder components • knowledge of manufacturers' specifications 	<p>190303b</p> <p>190303e</p>	<p>Torque Converter Fundamentals and Service</p> <p>Hydraulic Retarder Fundamentals And On-The Job Training</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of start-up procedures • ability to remove torque converter, fluid coupler and retarder components • ability to disassemble torque converter, fluid coupler and retarder components • ability to determine reusability of torque converter, fluid coupler and retarder components • ability to recondition torque converter, fluid coupler and retarder components • ability to assemble torque converter, fluid coupler and retarder components • ability to install torque converter, fluid coupler and retarder components • ability to perform start-up procedures • ability to perform final adjustments 		
9.03	Repairs driveline systems	<ul style="list-style-type: none"> • knowledge of driveline system components • knowledge of procedures to remove driveline system components 	<p>190303i</p> <p>190303jA</p>	<p>Final Drive Fundamentals & Service (Off Road)</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of procedures to disassemble driveline system components • knowledge of procedures to assemble driveline system components • knowledge of procedures to install driveline system components • knowledge of manufacturers' specifications • ability to remove driveline system components • ability to disassemble driveline system components • ability to determine reusability of driveline system components • ability to recondition driveline system components • ability to assemble driveline system components • ability to install driveline system components 	190303jB	Road) Part A Drive Axle and Carrier Fundamentals and Service (Off-Road) Part B

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> ability to perform final adjustments 		
9.04	Repairs transmission and transfer case systems	<ul style="list-style-type: none"> knowledge of transmission and transfer case system components knowledge of procedures to remove transmission and transfer case system components knowledge of procedures to disassemble transmission and transfer case system components knowledge of procedures to assemble transmission and transfer case system components knowledge of procedure to install transmission and transfer case system components knowledge of manufacturers' specifications knowledge of start-up procedures knowledge of break-in procedures ability to remove transmission and transfer case system components 	<p>190401c</p> <p>190401dA</p> <p>190401dB</p> <p>190401e</p> <p>190401f</p> <p>190401g</p> <p>190303c</p> <p>190303d</p> <p>190303f</p> <p>190401g</p>	<p>Gearing Principles</p> <p>Transmission Fundamentals – Part A</p> <p>Transmission Fundamentals – Part B</p> <p>Transmission Shifting</p> <p>Transmission Service</p> <p>Transfer Case & Auxiliary Devices</p> <p>Powershift & Automatic Transmission Mechanical/Electrical Components</p> <p>Powershift and Automatic Transmission Control & Shifting</p> <p>Powershift & Automatic Transmission Testing & Service</p> <p>Transfer Case & Auxiliary Drives</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to disassemble transmission and transfer case system components • ability to determine reusability of transmission and transfer case system components • ability to recondition transmission and transfer case system components • ability to assemble transmission and transfer case system components • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 		
9.05	Repairs axle and differential systems	<ul style="list-style-type: none"> • knowledge of axle and differential system components • knowledge of procedures to remove axle and differential system components • knowledge of procedures to disassemble axle and differential system components 	<p>190303i</p> <p>190303jA</p> <p>190303jB</p>	<p>Final Drive Fundamentals & Service (Off Road)</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part A</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part B</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of procedures to assemble axle and differential system components • knowledge of procedures to install axle and differential system components • knowledge of manufacturers' specifications • ability to remove axle and differential system components • ability to disassemble axle and differential system components • ability to determine reusability of axle and differential system components • ability to recondition axle and differential system components • ability to assemble axle and differential system components • ability to install axle and differential system components • ability to perform final adjustments 		

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
9.06	Repairs final drive systems	<ul style="list-style-type: none"> • knowledge of final drive system components • knowledge of procedures to remove final drive system components • knowledge of procedures to disassemble final drive system components • knowledge of procedures to assemble final drive system components • knowledge of procedures to install final drive system components • knowledge of manufacturers' specifications • ability to remove final drive system components • ability to disassemble final drive system components • ability to determine reusability of final drive system components • ability to recondition final drive system components 	<p>190303i</p> <p>190303jA</p> <p>190303jB</p>	<p>Final Drive Fundamentals & Service (Off Road)</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part A</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part B</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to assemble final drive system components • ability to install final drive system components • ability to perform final adjustments 		
9.07	Verifies repair of drive train systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	<p>190303i</p> <p>190303jA</p> <p>190303jB</p>	<p>Final Drive Fundamentals & Service (Off Road)</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part A</p> <p>Drive Axle and Carrier Fundamentals and Service (Off-Road) Part B</p>

E STEERING, SUSPENSION AND BRAKES

13%

10 DIAGNOSES STEERING, SUSPENSION AND BRAKE SYSTEMS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
10.01	Diagnoses steering systems	<ul style="list-style-type: none">• knowledge of steering system types and operation• knowledge of steering system components• knowledge of steering system specifications• knowledge of diagnostic tools• knowledge of diagnostic testing procedures• ability to complete sensory inspection• ability to use diagnostic tools• ability to perform and interpret steering system tests	190303gA 190303gB 190402a 190402b 190402c	Tracked Equipment Steering Fundamentals and Service Part A Tracked Equipment Steering Fundamentals and Service Part A Steering Fundamentals Steering Service Steering Angles & Alignment
10.02	Diagnoses suspension systems	<ul style="list-style-type: none">• knowledge of suspension system types and operation	190102a 190102b	Frame & Suspension Fundamentals Frame & Suspension Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of suspension system components • knowledge of suspension system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret suspension system tests 		
10.03	Diagnoses braking systems	<ul style="list-style-type: none"> • knowledge of braking system types and operation • knowledge of braking system components • knowledge of braking system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing 	190106a 190106b 190106cA 190106cB 190106d	Air Brake System Fundamentals Air Brake System Mechanical Components Truck/Tractor Air Brake System Components – Part A Truck/Tractor Air Brake System Components – Part B Trailer Air Brake System

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>procedures</p> <ul style="list-style-type: none"> • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret braking system tests • ability to check adjustments 	<p>190106e</p> <p>190103a</p> <p>190103b</p> <p>190103c</p> <p>190103d</p> <p>190103e</p>	<p>Components</p> <p>Air Brake Testing and Service</p> <p>Hydraulic Brake System Fundamentals</p> <p>Hydraulic Brake System (Drum & Disc)</p> <p>Hydraulic Brake System Diagnosis & Service</p> <p>Hydraulic Brake Booster System Fundamentals & Service</p> <p>Parking Brake System fundamentals & Service</p>
10.04	Diagnoses wheel assemblies	<ul style="list-style-type: none"> • knowledge of wheel construction and types • knowledge of wear limits • knowledge of tire construction • knowledge of the effects of related systems on wheel assemblies such as steering, suspension and braking systems 	<p>190102c</p> <p>190102d</p>	<p>Bearings and Seals</p> <p>Wheels, Tires and Hubs</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of types and applications of tire chains • knowledge of wheel assembly removal procedures • knowledge of manufacturers' specifications • ability to remove wheel assemblies • ability to inspect mounting hardware and wheel assemblies for cuts, pressure and cracks 		
10.05	Diagnoses undercarriage systems	<ul style="list-style-type: none"> • knowledge of undercarriage system types and operation • knowledge of undercarriage system components • knowledge of undercarriage system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection 	190303h	Undercarriage Systems Fundamentals and Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to use diagnostic tools • ability to perform and interpret undercarriage system tests 		

11 REPAIRS STEERING, SUSPENSION AND BRAKE SYSTEMS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
11.01	Repairs steering systems	<ul style="list-style-type: none"> • knowledge of steering system components • knowledge of procedures to remove steering system components • knowledge of procedures to disassemble steering system components • knowledge of procedures to assemble steering system components • knowledge of procedures to install steering system components • knowledge of manufacturers' specifications 	<p>190303gA</p> <p>190303gB</p> <p>190402a</p> <p>190402b</p> <p>190402c</p>	<p>Tracked Equipment Steering Fundamentals and Service Part A</p> <p>Tracked Equipment Steering Fundamentals and Service Part A</p> <p>Steering Fundamentals</p> <p>Steering Service</p> <p>Steering Angles & Alignment</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of start-up procedures • ability to remove steering system components • ability to disassemble steering system components • ability to determine reusability of steering system components • ability to recondition steering system components • ability to assemble steering system components • ability to install steering system components • ability to perform start-up procedures • ability to perform final adjustments 		
11.02	Repairs suspension systems	<ul style="list-style-type: none"> • knowledge of suspension system components • knowledge of procedures to remove suspension system components 	190102a 190102b	Frame & Suspension Fundamentals Frame & Suspension Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of procedures to disassemble suspension system components • knowledge of procedures to assemble suspension system components • knowledge of procedures to install suspension system components • knowledge of manufacturers' specifications • ability to remove suspension system components • ability to disassemble suspension system components • ability to determine reusability of suspension system components • ability to recondition suspension system components • ability to assemble suspension system components • ability to install suspension system components 		

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to perform final adjustments 		
11.03	Repairs braking systems	<ul style="list-style-type: none"> • knowledge of braking system components • knowledge of procedures to remove braking system components • knowledge of procedures to disassemble braking system components • knowledge of procedures to assemble braking system components • knowledge of procedures to install braking system components • knowledge of manufacturers' specifications • knowledge of start-up procedures • knowledge of break-in procedures • ability to remove braking system components • ability to disassemble braking system components 	<p>190106a</p> <p>190106b</p> <p>190106cA</p> <p>190106cB</p> <p>190106c</p> <p>190106e</p> <p>190103a</p> <p>190103b</p> <p>190103c</p> <p>190103d</p> <p>190103e</p>	<p>Air Brake System Fundamentals</p> <p>Air Brake System Mechanical Components</p> <p>Truck/Tractor Air Brake System Components – Part A</p> <p>Truck/Tractor Air Brake System Components – Part B</p> <p>Trailer Air Brake System Components</p> <p>Air Brake Testing and Service</p> <p>Hydraulic Brake System Fundamentals</p> <p>Hydraulic Brake System (Drum & Disc)</p> <p>Hydraulic Brake System Diagnosis & Service</p> <p>Hydraulic Brake Booster System Fundamentals & Service</p> <p>Parking Brake System</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to determine reusability of braking system components • ability to recondition braking system components • ability to assemble braking system components • ability to install braking system components • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 		fundamentals & Service
11.04	Repairs wheel assemblies	<ul style="list-style-type: none"> • knowledge of wheel assembly components • knowledge of procedures to remove wheel assembly components • knowledge of procedures to disassemble wheel assembly components • knowledge of procedures to assemble wheel assembly components 	190102c 190102d	Bearings and Seals Wheels, Tires and Hubs

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of procedures to install wheel assembly components • knowledge of manufacturers' specifications • ability to remove wheel assembly components • ability to disassemble wheel assembly components • ability to determine reusability of wheel assembly components • ability to recondition wheel assembly components • ability to assemble wheel assembly components • ability to install wheel assembly components • ability to perform final adjustments 		
11.05	Repairs undercarriage systems	<ul style="list-style-type: none"> • knowledge of undercarriage system components • knowledge of procedures to remove 	190303h	Undercarriage Systems Fundamentals and Service

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>undercarriage system components</p> <ul style="list-style-type: none"> • knowledge of procedures to disassemble undercarriage system components • knowledge of procedures to assemble undercarriage system components • knowledge of procedures to install undercarriage system components • knowledge of manufacturers' specifications • knowledge of break-in procedures • ability to remove undercarriage system components • ability to disassemble undercarriage system components • ability to determine reusability of undercarriage system components • ability to recondition undercarriage system components • ability to assemble undercarriage 		

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>system components</p> <ul style="list-style-type: none"> • ability to install undercarriage system components • ability to perform break-in procedures • ability to perform final adjustments 		
11.06	Verifies repair of steering, suspension and braking systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 		<i>See 11.01 – 5.05</i>

F ELECTRICAL AND ELECTRONIC SYSTEMS**19%****12 DIAGNOSES ELECTRICAL AND ELECTRONIC SYSTEMS**

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
12.01	Diagnoses electrical systems	<ul style="list-style-type: none">• knowledge of electrical system types and operation• knowledge of electrical system components• knowledge of electrical system specifications• knowledge of diagnostic tools• knowledge of diagnostic testing procedures• ability to complete sensory inspection• ability to use diagnostic tools• ability to perform and interpret electrical system tests	190104a 190104b 190104d 190104e 190104fA 190104fB 190104g 190104h 190205a 190205b	Electrical Theory Electrical Circuits Test Equipment Battery Fundamentals & Service Electrical Wiring, Lighting Circuits and Circuit Protection Part A Electrical Wiring, Lighting Circuits and Circuit Protection Part B Basic Electronics Electronic Control Systems Charging System and Control Circuit Fundamentals Charging System Testing & Service Cranking System Fundamentals

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			190205c	and Motor Drives
			190205d	Cranking System Control Circuits
			190205e	Cranking System Testing and Service
			190205f	Non-electric Cranking Systems
			190405a	Truck Electrical Circuit Fundamentals
			190405b	Truck Electrical Circuit Service
			<u>Automotive Service</u>	<u>Technician Modules</u>
			090303a	Ignition System Fundamentals
			090303b	Distributor Ignition Systems
			090303c	Electronic Ignition Systems
			090303d	Ignition System Diagnosis and Service
			A090305a	Ignition System Fundamentals
12.02	Diagnoses electronic systems	<ul style="list-style-type: none"> knowledge of electronic system types and operation 	190104a	Electrical Theory

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of electronic system components 	190104b	Electrical Circuits
			190104d	Test Equipment
		<ul style="list-style-type: none"> • knowledge of electronic system specifications 	190104e	Battery Fundamentals & Service
		<ul style="list-style-type: none"> • knowledge of diagnostic tools 	190104fA	Electrical Wiring, Lighting Circuits and Circuit Protection Part A
		<ul style="list-style-type: none"> • knowledge of diagnostic testing procedures 	190104fB	Electrical Wiring, Lighting Circuits and Circuit Protection Part B
		<ul style="list-style-type: none"> • ability to complete sensory inspection 	190104g	Basic Electronics
		<ul style="list-style-type: none"> • ability to use diagnostic tools 	190104h	Electronic Control Systems
		<ul style="list-style-type: none"> • ability to perform and interpret electronic system tests 	190205a	Charging System and Control Circuit Fundamentals
			190205b	Charging System Testing & Service
			190205c	Cranking System Fundamentals and Motor Drives
			190205d	Cranking System Control Circuits
			190205e	Cranking System Testing and Service
			190205f	Non-electric Cranking Systems

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			190405a	Truck Electrical Circuit Fundamentals
			190405b	Truck Electrical Circuit Service
			<u>Automotive Service</u>	<u>Technician Modules</u>
			090303a	Ignition System Fundamentals
			090303b	Distributor Ignition Systems
			090303c	Electronic Ignition Systems
			090303d	Ignition System Diagnosis and Service
			A090305a	Ignition System Fundamentals

13 REPAIRS ELECTRICAL AND ELECTRONIC SYSTEMS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
13.01	Repairs electrical systems	<ul style="list-style-type: none"> • knowledge of electrical system components • knowledge of procedures to remove 	190104a	Electrical Theory
			190104b	Electrical Circuits

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		electrical system components	190104d	Test Equipment
		<ul style="list-style-type: none"> • knowledge of procedures to disassemble electrical system components 	190104e	Battery Fundamentals & Service
		<ul style="list-style-type: none"> • knowledge of wire harness repair procedures 	190104fA	Electrical Wiring, Lighting Circuits and Circuit Protection Part A
		<ul style="list-style-type: none"> • knowledge of wire harness repair procedures 	190104fB	Electrical Wiring, Lighting Circuits and Circuit Protection Part B
		<ul style="list-style-type: none"> • knowledge of procedures to assemble electrical system components 	190104g	Basic Electronics
		<ul style="list-style-type: none"> • knowledge of procedures to install electrical system components 	190104h	Electronic Control Systems
		<ul style="list-style-type: none"> • knowledge of manufacturers' specifications 	190205a	Charging System and Control Circuit Fundamentals
		<ul style="list-style-type: none"> • ability to remove electrical system components 	190205b	Charging System Testing & Service
		<ul style="list-style-type: none"> • ability to disassemble electrical system components 	190205c	Cranking System Fundamentals and Motor Drives
		<ul style="list-style-type: none"> • ability to determine reusability of electrical system components 	190205d	Cranking System Control Circuits
		<ul style="list-style-type: none"> • ability to determine reusability of electrical system components 	190205e	Cranking System Testing and Service
		<ul style="list-style-type: none"> • ability to recondition electrical system components 	190205f	Non-electric Cranking Systems
			190405a	Truck Electrical Circuit

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to repair wire harnesses • ability to assemble electrical system components • ability to install electrical system components • ability to perform final adjustments 	<p>190405b</p> <p><u>Automotive Service</u></p> <p>090303a</p> <p>090303b</p> <p>090303c</p> <p>090303d</p> <p>A090305a</p>	<p>Fundamentals</p> <p>Truck Electrical Circuit Service</p> <p><u>Technician Modules</u></p> <p>Ignition System Fundamentals</p> <p>Distributor Ignition Systems</p> <p>Electronic Ignition Systems</p> <p>Ignition System Diagnosis and Service</p> <p>Ignition System Fundamentals</p>
13.02	Repairs electronic systems	<ul style="list-style-type: none"> • knowledge of electronic system components • knowledge of manufacturers' specifications • knowledge of static discharge procedures • knowledge of procedures to remove electronic system components • knowledge of procedures to replace 	<p>190104a</p> <p>190104b</p> <p>190104d</p> <p>190104e</p> <p>190104fA</p> <p>190104fB</p>	<p>Electrical Theory</p> <p>Electrical Circuits</p> <p>Test Equipment</p> <p>Battery Fundamentals & Service</p> <p>Electrical Wiring, Lighting Circuits and Circuit Protection Part A</p> <p>Electrical Wiring, Lighting Circuits and Circuit Protection Part B</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		electronic system components	190104g	Basic Electronics
		• knowledge of wire harness repair procedures	190104h	Electronic Control Systems
		• knowledge of electronic component programming procedures	190205a	Charging System and Control Circuit Fundamentals
		• knowledge of calibration procedures	190205b	Charging System Testing & Service
		• ability to perform static discharge procedures	190205c	Cranking System Fundamentals and Motor Drives
		• ability to remove electronic system components	190205d	Cranking System Control Circuits
		• ability to install/replace electronic system components	190205e	Cranking System Testing and Service
		• ability to repair wire harnesses	190205f	Non-electric Cranking Systems
		• ability to retrieve data from failed components	190405a	Truck Electrical Circuit Fundamentals
		• ability to program new electronic system components for intended use	190405b	Truck Electrical Circuit Service
		• ability to perform calibration/adjustment procedures	<u>Automotive Service</u>	<u>Technician Modules</u>
			090303a	Ignition System Fundamentals
			090303b	Distributor Ignition Systems

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			090303c	Electronic Ignition Systems
			090303d	Ignition System Diagnosis and Service
			A090305a	Ignition System Fundamentals
13.03	Verifies repair of electrical and electronic systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance • ability to determine if additional corrective action is required • ability to clear service codes • ability to perform sensory inspection • ability to use diagnostic tools 		<i>See 13.01 – 13.02</i>

G STRUCTURAL COMPONENTS, CLIMATE CONTROL, ACCESSORIES AND ATTACHMENTS

8%

14 DIAGNOSES AND REPAIRS HVAC SYSTEMS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
14.01	Diagnoses heating systems	<ul style="list-style-type: none"> • knowledge of heating system types and operation • knowledge of heating system components • knowledge of heating system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret heating system tests 	<p>190403a</p> <p>190403b</p> <p>190403cA</p> <p>190403cB</p>	<p>Air Conditioning Fundamentals</p> <p>HVAC Control systems</p> <p>Air Conditioning Testing and Service – Part A</p> <p>Air Conditioning Testing and Service – Part B</p>
14.02	Repairs heating	<ul style="list-style-type: none"> • knowledge of heating system 	190403a	Air Conditioning Fundamentals

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
	systems	components <ul style="list-style-type: none"> • knowledge of procedures to remove heating system components • knowledge of procedures to disassemble heating system components • knowledge of procedures to assemble heating system components • knowledge of procedures to install heating system components • knowledge of manufacturers' specifications • knowledge of start-up procedures • ability to remove heating system components • ability to disassemble heating system components • ability to determine reusability of heating system components • ability to recondition heating system 	190403b 190403cA 190403cB	HVAC Control systems Air Conditioning Testing and Service – Part A Air Conditioning Testing and Service – Part B

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> components • ability to assemble heating system components • ability to install heating system components • ability to perform start-up procedures • ability to perform final adjustments 		
14.03	Verifies repair of heating systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	190403a 190403b 190403cA 190403cB	Air Conditioning Fundamentals HVAC Control systems Air Conditioning Testing and Service – Part A Air Conditioning Testing and Service – Part B
14.04	Diagnoses ventilation systems	<ul style="list-style-type: none"> • knowledge of ventilation system types and operation • knowledge of ventilation system components • knowledge of ventilation system 	190403a 190403b 190403cA	Air Conditioning Fundamentals HVAC Control systems Air Conditioning Testing and Service – Part A

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		specifications <ul style="list-style-type: none"> • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret ventilation system tests 	190403cB	Air Conditioning Testing and Service – Part B
14.05	Repairs ventilation systems	<ul style="list-style-type: none"> • knowledge of ventilation system components • knowledge of procedures to remove ventilation system components • knowledge of procedures to disassemble ventilation system components • knowledge of procedures to assemble ventilation system components • knowledge of procedures to install ventilation system components • knowledge of manufacturers’ 	190403a 190403b 190403cA 190403cB	Air Conditioning Fundamentals HVAC Control systems Air Conditioning Testing and Service – Part A Air Conditioning Testing and Service – Part B

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		specifications <ul style="list-style-type: none"> • knowledge of break-in procedures • ability to remove ventilation system components • ability to disassemble ventilation system components • ability to determine reusability of ventilation system components • ability to recondition ventilation system components • ability to assemble ventilation system components • ability to install ventilation system components • ability to perform break-in procedures • ability to perform final adjustments 		
14.06	Verifies repair of ventilation systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance 	190403a 190403b 190403cA	Air Conditioning Fundamentals HVAC Control systems Air Conditioning Testing and

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	190403cB	Service – Part A Air Conditioning Testing and Service – Part B
14.07	Diagnoses air conditioning systems	<ul style="list-style-type: none"> • knowledge of air conditioning system types and operation • knowledge of air conditioning system components • knowledge of air conditioning system specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret air conditioning system tests 	190403a 190403b 190403cA 190403cB	Air Conditioning Fundamentals HVAC Control systems Air Conditioning Testing and Service – Part A Air Conditioning Testing and Service – Part B
14.08	Repairs air conditioning systems	<ul style="list-style-type: none"> • knowledge of government regulations (ODS – ozone depleting substances) 	190403a	Air Conditioning Fundamentals

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of air conditioning system components • knowledge of procedures to remove air conditioning system components • knowledge of procedures to disassemble air conditioning system components • knowledge of procedures to assemble air conditioning system components • knowledge of procedures to install air conditioning system components • knowledge of manufacturers' specifications • knowledge of break-in procedures • ability to remove air conditioning system components • ability to disassemble air conditioning system components • ability to determine reusability of air conditioning system components 	<p>190403b</p> <p>190403cA</p> <p>190403cB</p>	<p>HVAC Control systems</p> <p>Air Conditioning Testing and Service – Part A</p> <p>Air Conditioning Testing and Service – Part B</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to recondition air conditioning system components • ability to assemble air conditioning system components • ability to install air conditioning system components • ability to perform break-in procedures • ability to perform final adjustments 		
14.09	Verifies repair of air conditioning systems	<ul style="list-style-type: none"> • knowledge of system specifications • knowledge of expected system performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	<p>190403a</p> <p>190403b</p> <p>190403cA</p> <p>190403cB</p>	<p>Air Conditioning Fundamentals</p> <p>HVAC Control systems</p> <p>Air Conditioning Testing and Service – Part A</p> <p>Air Conditioning Testing and Service – Part B</p>

15 SERVICES STRUCTURAL COMPONENTS

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
15.01	Diagnoses structural components	<ul style="list-style-type: none"> • knowledge of manufacturers' specifications • knowledge of structural component construction • knowledge of government regulations • knowledge of defect detection methods • ability to follow manufacturers' procedures • ability to follow government regulations • ability to check for defects 	190302b 190302cA 190302cB <u>Millwright</u> 160109aA 160109aB 160109aC 160109b	Suspension System Fundamentals and Service Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part A <u>Modules</u> Rigging Procedures – Part A Rigging Procedures – Part B Rigging Procedures – Part C Cranes and Hoists
15.02	Performs mechanical repairs on structural components	<ul style="list-style-type: none"> • knowledge of structural components • knowledge of procedures to remove structural components • knowledge of procedures to disassemble structural components • knowledge of procedures to assemble 	190302b 190302cA 190302cB	Suspension System Fundamentals and Service Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part A

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		structural components <ul style="list-style-type: none"> • knowledge of procedures to install structural components • knowledge of manufacturers' specifications • ability to remove structural components • ability to disassemble structural components • ability to determine reusability of structural components • ability to recondition structural components • ability to assemble structural components • ability to install structural components • ability to perform final adjustments 	<u>Millwright</u> 160109aA 160109aB 160109aC 160109b	<u>Modules</u> Rigging Procedures – Part A Rigging Procedures – Part B Rigging Procedures – Part C Cranes and Hoists
15.03	Verifies mechanical repair of structural components	<ul style="list-style-type: none"> • knowledge of component specifications • knowledge of expected component performance 	190302b 190302cA	Suspension System Fundamentals and Service Off Road Equipment Accessories and Attachments – Part A

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	190302cB <u>Millwright</u> 160109aA 160109aB 160109aC 160109b	Off Road Equipment Accessories and Attachments – Part A <u>Modules</u> Rigging Procedures – Part A Rigging Procedures – Part B Rigging Procedures – Part C Cranes and Hoists

16 SERVICES OPERATOR STATION

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
16.01	Diagnoses operator station components	<ul style="list-style-type: none"> • knowledge of operator station types and operation • knowledge of operator station components • knowledge of operator station and component specifications • knowledge of company regulations and 		Considered On The Job Training

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>manufacturers' specifications</p> <ul style="list-style-type: none"> • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to perform and interpret operator station component tests 		
16.02	Repairs operator station components	<ul style="list-style-type: none"> • knowledge of operator station components • knowledge of procedures to remove operator station components • knowledge of procedures to disassemble operator station components • knowledge of procedures to assemble operator station components • knowledge of procedures to install operator station components • knowledge of manufacturers' 		Considered On The Job Training

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		specifications <ul style="list-style-type: none"> • ability to remove operator station components • ability to disassemble operator station components • ability to determine reusability of operator station components • ability to recondition operator station components • ability to assemble operator station components • ability to install operator station components • ability to perform final adjustments 		
16.03	Verifies repair of operator station components	<ul style="list-style-type: none"> • knowledge of operator station specifications • knowledge of expected operator station performance • ability to perform sensory inspection • ability to use diagnostic tools 		Considered On The Job Training

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> ability to determine if additional corrective action is required 		

17 INSTALLS, DIAGNOSES AND REPAIRS ATTACHMENTS AND ACCESSORIES

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
17.01	Installs attachments	<ul style="list-style-type: none"> knowledge of manufacturers' specifications and procedures knowledge of company standards knowledge of modification techniques required to integrate attachment ability to follow manufacturers' specifications ability to integrate attachment 	<p>190302cA</p> <p>190302cB</p>	<p>Off Road Equipment Accessories and Attachments – Part A</p> <p>Off Road Equipment Accessories and Attachments – Part A</p>
17.02	Diagnoses attachments	<ul style="list-style-type: none"> knowledge of attachment types and intended operation knowledge of method of operation knowledge of attachment components 	<p>190302cA</p> <p>190302cB</p>	<p>Off Road Equipment Accessories and Attachments – Part A</p> <p>Off Road Equipment Accessories and Attachments – Part A</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • knowledge of attachment specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to operate attachment • ability to perform and interpret attachment tests 		
17.03	Repairs attachments	<ul style="list-style-type: none"> • knowledge of attachment components • knowledge of procedures to remove attachment components • knowledge of machine systems related to attachments • knowledge of procedures to disassemble attachment components • knowledge of procedures to assemble attachment components • knowledge of procedures to install 	<p>190302cA</p> <p>190302cB</p>	<p>Off Road Equipment Accessories and Attachments – Part A</p> <p>Off Road Equipment Accessories and Attachments – Part A</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>attachment components</p> <ul style="list-style-type: none"> • knowledge of manufacturers' specifications • knowledge of company standards • knowledge of start-up procedures • knowledge of break-in procedures • ability to remove attachment components • ability to disassemble attachment components • ability to determine reusability of attachment components • ability to recondition attachment components • ability to assemble attachment components • ability to install attachment components • ability to perform start-up procedures 		

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<ul style="list-style-type: none"> • ability to perform break-in procedures • ability to perform final adjustments 		
17.04	Verifies repair of attachments	<ul style="list-style-type: none"> • knowledge of attachment specifications • knowledge of expected attachment performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	190302cA 190302cB	Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part A
17.05	Installs accessories	<ul style="list-style-type: none"> • knowledge of manufacturers’ specifications and procedures • knowledge of company standards • knowledge of modification techniques required to integrate accessories • ability to follow manufacturers’ specifications • ability to integrate accessories 	190302b 190302cA 190302cB <u>Millwright</u> 160109aA 160109aB	Suspension System Fundamentals and Service Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part A <u>Modules</u> Rigging Procedures – Part A Rigging Procedures – Part B

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
			160109aC	Rigging Procedures – Part C
			160109b	Cranes and Hoists
17.06	Diagnoses accessories	<ul style="list-style-type: none"> • knowledge of accessory types and intended operation • knowledge of method of operation • knowledge of accessory components • knowledge of accessory specifications • knowledge of diagnostic tools • knowledge of diagnostic testing procedures • ability to complete sensory inspection • ability to use diagnostic tools • ability to operate accessories • ability to perform and interpret accessory tests 	190302b 190302cA 190302cB <u>Millwright</u> 160109aA 160109aB 160109aC 160109b	Suspension System Fundamentals and Service Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part A <u>Modules</u> Rigging Procedures – Part A Rigging Procedures – Part B Rigging Procedures – Part C Cranes and Hoists
17.07	Repairs accessories	<ul style="list-style-type: none"> • knowledge of accessory components • knowledge of procedures to remove 	190302b 190302cA	Suspension System Fundamentals and Service Off Road Equipment Accessories

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		<p>accessory components</p> <ul style="list-style-type: none"> • knowledge of machine systems related to accessories • knowledge of procedures to disassemble accessory components • knowledge of procedures to assemble accessory components • knowledge of procedures to install accessory components • knowledge of manufacturers' specifications • knowledge of start-up procedures • knowledge of break-in procedures • ability to remove accessory components • ability to disassemble accessory components • ability to determine reusability of accessory components • ability to recondition accessory 	<p>190302cB</p> <p><u>Millwright</u></p> <p>160109aA</p> <p>160109aB</p> <p>160109aC</p> <p>160109b</p>	<p>and Attachments – Part A</p> <p>Off Road Equipment Accessories and Attachments – Part A</p> <p><u>Modules</u></p> <p>Rigging Procedures – Part A</p> <p>Rigging Procedures – Part B</p> <p>Rigging Procedures – Part C</p> <p>Cranes and Hoists</p>

	Subtask	Enabling Objective	ILM Module Number	ILM Module Name
		components <ul style="list-style-type: none"> • ability to assemble accessory components • ability to install accessory components • ability to perform start-up procedures • ability to perform break-in procedures • ability to perform final adjustments 		
17.08	Verifies repair of accessories	<ul style="list-style-type: none"> • knowledge of accessory specifications • knowledge of expected accessory performance • ability to perform sensory inspection • ability to use diagnostic tools • ability to determine if additional corrective action is required 	190302b 190302cA 190302cB <u>Millwright</u> 160109aA 160109aB 160109aC 160109b	Suspension System Fundamentals and Service Off Road Equipment Accessories and Attachments – Part A Off Road Equipment Accessories and Attachments – Part A <u>Modules</u> Rigging Procedures – Part A Rigging Procedures – Part B Rigging Procedures – Part C Cranes and Hoists

