



**Occupational Task List
For
Heavy Equipment and Transport Technology Service
Technician**

Developed by: *The AED Foundation*

Heavy Equipment Service Technician

The following document is a detailed outline of the common tasks a heavy equipment service technician performs. This document was originally developed to obtain approval for the Equipment & Technology Institute program in Chicago Illinois from the Illinois State Board of Education and serves as an excellent outline for development of such a program and its technical curriculum.

The Equipment & Technology Institute is a high school program designed to raise the quality and quantity of young people looking for careers in the construction equipment industry.

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Duty A: **Performing General Safety Practices**

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|--------|----|---|
| Tasks: | 1 | Comply with shop and equipment safety rules |
| | 2 | Safe use of basic hand tools |
| | 3 | Safe use of basic electric hand tools |
| | 4 | Safe use of air tools |
| | 5 | Safe use of hydraulic tools |
| | 6 | Safe use of lifting equipment |
| | 7 | Safe use of cleaning equipment |
| | 8 | Safe use of metal cutting and welding equipment |
| | 9 | Safe use of blasting equipment |
| | 10 | Safe use of hydraulic test equipment |
| | 11 | Apply first aid procedures |
| | 12 | Complete an accident report |
| | 13 | Inspect the workplace for safe working environment |
| | 14 | Report shop safety violations |
| | 15 | Correct safety violations |
| | 16 | Participate in shop safety committee |
| | 17 | Comply with OSHA regulations |
| | 18 | Safe operation of machinery to be worked on |
| | 19 | Practice general safe work habits in the shop and in the field. |
| | 20 | Safe storage of engines fuel, and lubricants |

Duty B: **Performing General Maintenance Control Functions**

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|--------|---|--|
| Tasks: | 1 | Complete labor time card |
| | 2 | Complete requests for procurement of parts |
| | 3 | Enter work performed on work orders |
| | 4 | Follow up on requisitions |
| | 5 | Initiate and complete work orders |
| | 6 | Initiate requests for parts |
| | 7 | Prepare reports of vehicle defects |
| | 8 | Obtain parts from parts department |

Duty C: **Performing General Housekeeping and Recordkeeping Activities**

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|--------|---|--|
| Tasks: | 1 | Clean and maintain work area and leave in safe condition |
| | 2 | Report problems to supervisor |
| | 3 | Determine basic maintenance procedures by using manuals |

Duty D: **Performing Precision Measurements**

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|--------|----|---|
| Tasks: | 1 | Measure parts using standard and metric measurement systems |
| | 2 | Measure parts with steel rule |
| | 3 | Measure parts using dial indicators |
| | 4 | Measure parts using outside micrometers |
| | 5 | Measure parts using inside micrometers |
| | 6 | Measure parts using depth micrometers |
| | 7 | Measure parts using special micrometers |
| | 8 | Measure parts using inside and outside calipers |
| | 9 | Measure threads |
| | 10 | Calibrate precision measuring tools |
| | 11 | Clean and store precision measuring tools |
| | 12 | Inspect part with comparison measuring tools |
| | 13 | Measure parts using telescoping gauges |
| | 14 | Measure parts using small hole gauges |

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- 15 Measure parts using boring gauges
- 16 Measure parts using radius gauges

Duty E: **Performing Basic Benchwork Operations**

- Tasks: 1 Cut threads with taps and dies
- 2 Remove thread fasteners and repair threads
- 3 Polish parts using coated abrasives
- 4 Disassemble, assemble and straighten parts using arbour press
- 5 Disassemble, fit and reassemble parts
- 6 Lift and position workpiece using hoists
- 7 Repair hand tools
- 8 Work materials with hand tools
- 9 Work materials with portable power tools

Duty F: **Use of Tools & Equipment**

- Tasks: 1 Identify basic hand tools
- 2 Proper use of hand tools
- 3 Maintain and sharpen drills/ chisels
- 4 Use of taps, dies, thread identification
- 5 Use of cleaners, solvents, hot tanks, hot water washers, glass head machines, and MSDS sheets
- 6 Use of pullers and pushers
- 7 Use of hydraulic press
- 8 Torque wrenches, torque turn methods, step torques and results of extension
- 9 Power driven tools
- 10 Straight edges, feeler and telescoping gauges
- 11 Micrometers, dial indicators, dial gauges, depth micrometers, vernier calipers
- 12 Speed indicators, magtachometers, thermocouples, manometer, pulse generators
- 13 Diagnostic tools, pressure groups
- 14 Special tools
- 15 Use of technical service manuals and special instructions

Duty G: **Engines and Fuel Systems: Maintaining Gas & Diesel Engines**

- Tasks: 1 Diagnose engine mechanical condition
- 2 Check Compression
- 3 Check oil pressure and levels
- 4 Pressure test and inspect cylinder block
- 5 Remove, inspect, replace and install pistons
- 6 Remove, inspect, replace and install piston rings
- 7 Remove, inspect, replace and install liner or cylinder sleeve
- 8 Remove, inspect, replace and install connecting rods
- 9 Remove, inspect, balance, replace and install crankshaft
- 10 Remove, inspect, replace and install camshaft
- 11 Remove, inspect, replace timing gear train
- 12 Remove, inspect, replace and install vibration damper
- 13 Remove, inspect, replace and install bearings
- 14 Remove, inspect, replace and install cylinder head
- 15 Remove, inspect, replace install oil pump
- 16 Clean engine components
- 17 Rebuild oil pump

- 18 Remove, inspect, replace and install water pump

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- 19 Rebuild water pump
- 20 Replace water pump seals
- 21 Remove, inspect, replace and install turbocharger
- 22 Rebuild turbocharger
- 23 Replace turbocharger bearings and seals
- 24 Remove, inspect, replace and install flywheel
- 25 Replace flywheel ring gear
- 26 Resurface flywheel
- 27 Remove, inspect, replace and install fan hub
- 28 Remove, inspect, replace and install oil cooler
- 29 Remove, inspect, replace and install oil filter and filter gasket
- 30 Bore engine cylinder
- 31 Remove, inspect, replace and install valve train
- 32 Remove, inspect, replace and install rocker arm assemblies
- 33 Remove, inspect, replace and install valves and valve seats
- 34 Grind valves
- 35 Grind or cut valve seats
- 36 Adjust valve clearance
- 37 Remove, inspect, replace and install gaskets
- 38 Remove, inspect, replace and install engine block
- 39 Rebuild two-cycle engine
- 40 Rebuild four-cycle engine
- 41 Install components on new block
- 42 Inspect compression release mechanism
- 43 Remove and replace compression release mechanism
- 44 Assemble and adjust ignition timing mechanism

Duty H: **Engines and Fuel Systems:** Maintaining Fuel Systems

- Tasks:
- 1 Diagnose fuel system problems
 - 2 Clean fuel system components
 - 3 Remove, inspect, replace and install fuel system
 - 4 Diagnose and repair fuel pump
 - 5 Diagnose and repair fuel injection system
 - 6 Disassemble, clean and reassemble fuel injection system
 - 7 Adjust fuel injection system
 - 8 Diagnose and repair carburetor problems
 - 9 Disassemble, clean and reassemble a pulsation-type carburetor
 - 10 Disassemble, clean and reassemble a vacuum-type carburetor
 - 11 Disassemble, clean and reassemble a float-type carburetor
 - 12 Diagnose and repair fuel gauge system
 - 13 Rebuild carburetor
 - 14 Adjust carburetor
 - 15 Adjust engine idle speed
 - 16 Service air cleaners
 - 17 Synchronize carburetors
 - 18 Remove, inspect, repair and install governor assembly
 - 19 Remove, inspect, replace and install intake manifolds
 - 20 Remove, inspect, replace and install crankcase breather
 - 21 Inspect and adjust throttle linkage
 - 22 Repair and adjust manual choke systems
 - 23 Troubleshoot fuel systems
 - 24 Remove, inspect, replace and install fuel filter

Duty I: **Engines and Fuel Systems:** Maintaining Cooling Systems

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- Tasks:
- 1 Diagnose cooling system problems
 - 2 Remove, inspect, replace and install air cooling system components
 - 3 Remove, inspect, replace and install water cooling system components
 - 4 Clean debris from cooling system
 - 5 Remove and replace radiators
 - 6 Remove and replace water pumps
 - 7 Remove and replace hoses

Duty J: **Engines and Fuel Systems:** Lubrication Services

- Tasks:
- 1 Inspect oil level and condition
 - 2 Change engine oil
 - 3 Clean debris from oil filter and other component
 - 4 Remove, inspect replace and install oil filter
 - 5 Select lubricants
 - 6 Grease bearings and bushings
 - 7 Remove, inspect, replace and install oil pump
 - 8 Remove, inspect, replace and install oil cooler

Duty K: **Engines and Fuel Systems:** Maintaining Exhaust Systems

- Tasks:
- 1 Diagnose exhaust system problems
 - 2 Inspect exhaust system
 - 3 Remove, inspect, replace and install exhaust manifold
 - 4 Remove, inspect, replace and install exhaust pipes
 - 5 Remove, inspect, replace and install muffler
 - 6 Remove, inspect, replace and install heat shield
 - 7 Remove, inspect, replace and install blower
 - 8 Clean exhaust system components

Duty M: **Electronics:** Maintaining Starting Systems

- Tasks:
- 1 Diagnose starting system problems
 - 2 Remove, inspect, replace and install engine pre-heat system
 - 3 Remove, inspect, replace and install contractor
 - 4 Remove, inspect, replace and install starter motor
 - 5 Remove, inspect, replace and install actuators
 - 6 Remove, inspect, replace and install sensors
 - 7 Clean starting system components

Duty L: **Electronics:** Maintaining Charging Systems

- Tasks:
- 1 Diagnose charging system problems
 - 2 Remove, inspect, replace and install pullies
 - 3 Remove, inspect, replace and install belts
 - 4 Remove, inspect, replace and install alternator
 - 5 Remove, inspect, replace and install regulator
 - 6 Remove, inspect, replace and install generator
 - 7 Remove, inspect, replace and install rectifiers
 - 8 Remove, inspect, replace and install diode assembly
 - 9 Remove, inspect, replace and install starter
 - 10 Remove, inspect, replace and install charging system components
 - 11 Rebuild alternator
 - 12 Rebuild generator
 - 13 Rebuild starter

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- 14 Clean charging system components
- 15 Diagnose and repair solenoid and relay problems
- 16 Remove, inspect, replace and install ignition switch
- 17 Remove, inspect, replace and install charging system gauges or indicator lights
- 18 Diagnose and repair charging circuit wiring system problems
- 19 Remove, inspect, replace and install battery
- 20 Prepare new battery for service
- 21 Troubleshoot charging circuits
- 22 Troubleshoot starting circuit

Duty N: **Electronics:** Maintaining Lighting & Accessory Systems

- Tasks: 1 Diagnose lighting & accessory system problems
- 2 Remove, inspect, replace and install motors
- 3 Remove, inspect, replace and install actuators
- 4 Remove, inspect, replace and install sensors
- 5 Diagnose and repair lighting & accessory circuit wiring system problems
- 6 Remove, inspect, replace and install switches
- 7 Remove, inspect, replace and install fuses
- 8 Remove, inspect, replace and install lamps

Duty O: **Electronics:** Maintaining Console Monitor Modules

- Tasks: 1 Diagnose monitor module problems
- 2 Remove, inspect, replace and install monitor module
- 3 Remove, inspect, replace and install sensors
- 4 Remove, inspect, replace and install diagnostic display
- 5 Remove, inspect, replace and install system inter-communication components
- 6 Diagnose and repair monitor module circuit wiring system problems
- 7 Troubleshoot console monitor module systems microprocessors

Duty P: **Electronics:** Maintaining Engine, Transmission & Hydraulic Electric Control Module Systems

- Tasks: 1 Diagnose and repair/adjust engine control module
- 2 Diagnose and repair/adjust Transmission control module
- 3 Diagnose and repair/adjust Hydraulic control module
- 9 Remove, inspect, replace and install actuators
- 4 Remove, inspect, replace and install sensors
- 5 Troubleshoot engine, transmission & hydraulic electric control module systems microprocessors

Duty Q: **Electronics:** Maintaining Ignition Systems

- Tasks: 1 Diagnose ignition system problems
- 2 Remove, inspect, clean, adjust, replace and install spark plugs
- 3 Remove, inspect, replace and install ignition wire
- 4 Remove, inspect, replace and install distributor cap and rotor
- 5 Remove, inspect, replace and install distributor
- 6 Adjust breaker points
- 7 Remove, inspect, replace and install points and condenser
- 8 Remove, inspect, replace and install plunger and guide
- 9 Adjust armature air gap

- 10 Remove, inspect, replace and install ignition coil
- 11 Remove, inspect, replace and install magneto
- 12 Diagnose electronic ignition components
- 13 Remove, inspect, replace and install electronic ignition components

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- 14 Remove, inspect, replace and install safety kills switches
- 15 Time electronic ignition system
- 16 Time magneto ignition system
- 17 Time battery coil ignition system
- 18 Troubleshoot an electronic ignition system
- 19 Troubleshoot an magneto ignition system
- 20 Troubleshoot an battery coil ignition system
- 21 Clean ignition system components

Duty R: **Hydraulics:** Maintaining Hydraulic Systems

- Tasks:
- 1 Diagnose hydraulic system problems
 - 2 Flush hydraulic system
 - 3 Repair leaks
 - 4 Check and maintain hydraulic fluid level
 - 5 Replace and inspect hydraulic fluid
 - 6 Remove, inspect, replace and install hydraulic motors
 - 7 Remove, inspect, replace and install hydraulic filter
 - 8 Remove, inspect, replace and install hydraulic pumps
 - 9 Remove, inspect, replace and install hydraulic cylinders
 - 10 Remove, inspect, replace and install hydraulic valves
 - 11 Remove, inspect, replace and install hydraulic lines and hoses
 - 12 Rebuild hydraulic motor
 - 13 Rebuild hydraulic pump
 - 14 Rebuild hydraulic valve
 - 15 Rebuild hydraulic cylinder
 - 16 Remove, inspect, replace and install actuators
 - 17 Remove, inspect, replace and install accumulators
 - 18 Remove, inspect, replace and install reservoirs
 - 19 Remove, inspect, replace and install oil coolers
 - 20 Rebuild hydraulic accumulators
 - 21 Clean hydraulic components
 - 22 Troubleshoot hydraulic systems

Duty S: **Power Trains (Transmissions):** Maintaining Power Train Systems

- Tasks:
- 1 Diagnose power train system problems
 - 2 Check fluid level
 - 3 Inspect manual transmission linkages, mounts, and controls
 - 4 Remove, inspect, replace and install transmission
 - 5 Remove, inspect, replace and install manual transmission linkages
 - 6 Rebuild manual transmission
 - 7 Diagnose chain drive problems
 - 8 Remove, inspect, replace and install chains drive mechanism
 - 9 Diagnose belt drive system problems
 - 10 Remove, inspect, replace and install belt drive system
 - 11 Diagnose gear drive problems
 - 12 Remove, inspect, replace and install gear drive system
 - 13 Diagnose hydrostatic transmission problems
 - 14 Remove, inspect, replace and install hydrostatic transmission
 - 15 Rebuild hydrostatic transmission
 - 16 Diagnose powershift transmission problems

 - 17 Remove, inspect, replace and install powershift transmission
 - 18 Rebuild powershift transmission
 - 19 Diagnose electronic-controlled transmissions
 - 20 Remove, inspect, replace and install electronic-controlled transmission

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- 21 Rebuild electronic-controlled transmission
- 22 Diagnose direct drive transmissions
- 23 Remove, inspect, replace and install direct drive transmission
- 24 Rebuild direct drive transmission
- 25 Clean power train components
- 26 Flush power train system
- 27 Remove, inspect and replace fluid
- 28 Remove, inspect, replace and install final drive
- 29 Rebuild final drive
- 30 Remove, inspect, replace and install clutch assembly
- 31 Rebuild clutch
- 32 Adjust clutch controls
- 33 Remove, inspect, replace and install bearings
- 34 Remove, inspect, replace and install flywheel
- 35 Remove, inspect, replace and install differential
- 36 Diagnose differential problems
- 37 Remove, inspect, replace and install gear reduction unit
- 38 Rebuild gear reduction unit
- 39 Diagnose driveshaft problems
- 40 Remove, inspect, replace and install driveshaft
- 41 Rebuild driveshaft
- 42 Diagnose torque converter
- 43 Remove, inspect, replace and install torque converter
- 44 Rebuild torque converter
- 45 Troubleshoot transmission systems problems

Duty T: Maintaining Chassis System

- Tasks:
- 1 Clean Chassis system components
 - 2 Diagnose manual steering systems problems
 - 3 Remove, inspect, replace and install manual steering system
 - 4 Inspect front wheel alignment
 - 5 Remove, inspect, replace and install manual steering system
 - 6 Remove, inspect, replace and install steering column
 - 7 Remove, inspect, replace and install steering gear
 - 8 Diagnose power steering system problems
 - 9 Remove, inspect, replace and install power steering system
 - 10 Remove, inspect, replace and install tie rods
 - 11 Remove, inspect, replace and install power steering hoses, lines, and belts
 - 12 Remove, inspect, replace and install power steering pump
 - 13 Rebuild power steering cylinder and control valves
 - 14 Remove, inspect, replace and install tires and wheels
 - 15 Diagnose wheel bearing problems
 - 16 Remove and replace wheel bearings
 - 17 Pack and adjust wheel bearings
 - 18 Replace flat tire
 - 19 Diagnose brake system problems
 - 20 Remove, inspect, replace and install brakes
 - 21 Adjust brakes
 - 22 Inspect frame and body
 - 23 Repair frame
 - 24 Repair body

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Duty U: Conducting Shop Operations

- Tasks:
- 1 Answer customer questions
 - 2 Troubleshoot customer problems

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- 3 Determine repair method
- 4 Perform public relations activities
- 5 Prepare service bill
- 6 Maintain accounts receivable and paid records
- 7 Maintain receiving records
- 8 Maintain records of service tools and equipment
- 9 Receive and store parts and supplies
- 10 Discuss delivery schedule with approved supplier
- 11 Order parts and supplies
- 12 Establish customer and equipment history file
- 13 Establish customer file
- 14 Update service manuals
- 15 Update parts catalog
- 16 Determine economic feasibility of repair
- 17 Calculate labor costs using organizational guidelines
- 18 Estimate total cost of repair
- 19 Prepare and submit warranty claims
- 20 Plan and layout a equipment service facility