

STATE OF SOUTH DAKOTA CLASS SPECIFICATION

Class Title: Equipment Technician

Class Code: 080432

Pay Grade: GH

A. Purpose:

Diagnoses and repairs computer and mechanical malfunctions in wheeled vehicles, industrial, and construction equipment to ensure safety of operators, safety to peripheral contacts, efficient operation, and the integrity of the equipment. Sets up new equipment by attaching auxiliary equipment, making necessary adaptations and adjustments; and running diagnostic tests of computer and mechanical systems to ensure equipment is in full operating condition.

B. Distinguishing Feature:

Equipment Technicians install, diagnose, and repair computer and mechanical systems on vehicles and equipment; and set up new equipment.

Equipment Shop Foremen prioritize and schedule equipment maintenance; plan and schedule work for staff; manage equipment shop and storeroom facilities and inventories; and supervise.

Equipment Mechanics install and repair mechanical systems and perform preventive maintenance on vehicles and equipment

C. Functions:

(These are examples only; any one position may not include all of the listed examples nor do the listed examples include all functions which may be found in positions of this class.)

1. Diagnoses computer systems to determine what causes intermittent data flows that trip computer codes, and makes necessary repairs to preserve the integrity of the computer systems.
 - a. Researches equipment systems and identifies computerized areas.
 - b. Researches and studies structural and procedural schematics for each computerized system.
 - c. Interviews equipment operators to compile data about equipment operation.
 - d. Interviews vendors to acquire information about operating systems.
 - e. Selects the starting and ending points of diagnoses and reviews internal scope patterns.
 - f. Operates computerized diagnostic equipment to read data.
 - g. Replaces computer sensors.
 - h. Operates repaired equipment to determine accuracy of diagnoses and repairs.
2. Diagnoses mechanical failures to determine extent, necessity, and cost effectiveness of repairs.
 - a. Researches and studies structural and procedural schematics and manuals.
 - b. Interviews equipment operators to compile data about equipment operation.
 - c. Interviews equipment vendors to compile data about operating systems.
 - d. Researches the history of the individual piece of equipment.
 - e. Determines the starting and ending points of diagnoses.
 - f. Determines extent of repairs and new parts needed.
 - i. Identifies alternative levels of repair.
 - ii. Recommends whether to recondition, fabricate, or buy new parts.
 - iii. Identifies acceptable levels of wear.
 - iv. Identifies peripheral damage.

3. Sets up new equipment to make sure it is road-ready and operational.
 - a. Evaluates the equipment and compiles part numbers and other data for historical purposes.
 - b. Identifies adjustments that will have to be made to accommodate auxiliary attachments and makes changes or passes the work to a specialist.
 - c. Identifies parts and materials needed to attach auxiliary equipment.
 - d. Develops and implements a work plan to accomplish assigned projects.
 - e. Operates the equipment to ensure that it is safe and working correctly.

4. Installs, troubleshoots, repairs, and replaces computer and mechanical system components to restore equipment to a safe and operational state, for example:
 - a. Maintains hydraulic systems.
 - i. Identifies type of system.
 - ii. Determines hydraulic needs and expands valve panels as needed.
 - iii. Manufactures hydraulic hoses.
 - iv. Measures and attaches piping.
 - b. Installs computer systems and programs computer software.
 - i. Mounts data collection computer in maintenance vehicles.
 - ii. Configures and tests software to collect and transmit data.
 - c. Installs and monitors electrical systems.
 - i. Reads wiring schematics and symbols.
 - ii. Installs strobe lights, radios, and headlight systems.
 - iii. Installs and troubleshoots distance-measuring instruments and radar.
 - iv. Operates electrical monitors and meters to monitor voltage.
 - d. Repairs suspension systems.
 - i. Repairs or replaces springs, struts, shocks, sway bars, torsion bars, etc.
 - ii. Reinforces suspension system to accommodate extra weight of attachments.
 - e. Repairs steering systems.
 - i. Repairs or replaces tie rods; gear assemblies; power steering pumps, lines, and wiring; steering assemblies; etc.
 - ii. Monitors and recommends wheel replacement.
 - f. Repairs brake systems.
 - i. Conducts pressure/leak tests on air and hydraulic brakes.
 - ii. Interfaces with brake control computer.
 - iii. Repairs, or replaces master cylinders, brake shoes, brake pads, etc.
 - g. Repairs drive trains.
 - i. Measures tolerances on gears and bearings.
 - ii. Repairs or replaces components of transmissions and differentials.
 - iii. Repairs clutches.
 - h. Repairs or replaces diesel and gasoline engines.
 - i. Repairs or replaces cylinders, pistons, timing chains, valve assemblies, gaskets, etc.
 - ii. Dismantles engines and determines which parts to replace to restore the engine.
 - i. Repairs fuel systems.
 - i. Repairs or replaces fuel pumps, lift pumps, fuel gauges, manifolds, carburetors, etc.
 - ii. Checks for air leaks into fuel system and fuel line restrictions.
 - iii. Monitors high-pressure fuel connectors to ensure operator safety.
 - j. Evaluates effectiveness of repairs by operating the equipment.

5. Fabricates and repairs equipment and parts by using a wide variety of welders, welding materials, and methods to adapt incompatible parts, replace unavailable parts, secure attachments, and repair damage.

- a. Conducts an initial evaluation of the job at hand.
 - i. Compiles notes.
 - ii. Determines materials needed.
 - iii. Determines type of welding, and welding materials needed.
 - iv. Takes measurements.
 - b. Draws designs of the work to be done.
 - c. Creates alternatives.
 - d. Estimates costs.
 - e. Performs the welding work.
6. Performs a variety of administrative record-keeping to comply with procedural guidelines.
 - a. Records part numbers from new equipment to equipment data file.
 - b. Updates equipment history file by including work done, parts changed, etc.
 - c. Opens and closes computer work orders.
 - d. Completes time sheets with work codes and hours worked to the correct equipment and department numbers.
 7. Performs other work as assigned.

D. Reporting Relationships:

Reports to an Equipment Shop Foreman. Does not supervise.

E. Challenges and Problems:

Challenged to acquire the expertise required to stay abreast of constant advances in technology. This is difficult because the equipment and software may be purchased and delivered, and technical training is often not readily available, which requires the incumbents to teach themselves through study and research. Further challenged to diagnose a computer or mechanical failure completely. This is difficult because diagnostic tools are not always available, wear on some system components is immeasurable, and incumbents must also determine how one system failure affects other systems.

Problems include maintaining technical knowledge of a wide variety of equipment and engines, from old to new, small to large, foreign and domestic, spanning forty years; fabricating parts and equipment from an idea; ensuring all the attachments added to a piece of equipment work together and still leave access to internal repairs; fabricating for both strength and weakness; understanding schematics that have different terminology and are very generic; dismantling several pieces of equipment at once while waiting for parts and putting everything back where it belongs.

F. Decision-making Authority:

Decisions include the scope of diagnoses, determining when the problems are covered; acceptable levels of wear; what changes need to be made to add auxiliary attachments; how to lay out conduit to protect wires and hydraulic hoses; if modifications to wiring systems are acceptable; safe operating levels for each piece of equipment; what system components to replace to ensure a long-term repair; which components to replace and which ones have life left; extent of self-application to study; what types of welders and welding materials to use; what types of hose and couplers to use when manufacturing hydraulic hoses; whether engine emissions meet EPA standards; recommending alternatives for high-cost repairs, including cost

estimates; recommending modifications to equipment specifications; and recommending the extent of repairs.

Decisions referred include final approval of high-cost repairs; final approval of most effective repair alternative; final approval of equipment specifications; whether to repair or surplus marginal equipment; work assignments and deadlines; whether engines should be overhauled or replaced; whether partially repaired equipment can be safely operated within certain restrictions; and cost analyses of repairs versus equipment value.

G. Contact with Others:

Daily contact with equipment operators to compile information regarding equipment operation and malfunctions; with Highway Maintenance Supervisors to diagnose breakdowns long distance; with partsroom staff to order parts; department research engineers regarding computer operating systems and software; and with other agencies to discuss repairs to their vehicles; and weekly contact with nationwide equipment manufacturers, suppliers, service technicians to obtain information about diagnosing and repairing equipment operating systems.

H. Working Conditions:

Equipment Technicians work on heavy equipment and are required to lift heavy objects, sometimes in awkward positions; they work at all angles, under and on top of equipment; in confining spaces, often between elements that are heavy and on jacks, and they are subject to falling equipment; they work around high-pressure hoses and connections, high voltage electricity, power presses, welders, and cutting torches; they are exposed to fumes from exhaust systems, welding, solvents, paints, and other fluids; they work with a wide variety of tools, many of which require extensive physical strength and manual dexterity; they work side-by-side with no separating walls and in small areas and are at risk from moving vehicles. Repairing or recovering stalled and broken down equipment on the road in high traffic areas and in adverse weather conditions.

I. Knowledge, Skills, and Abilities:

Knowledge of:

- the standard principles, methods, tools, and equipment of the automotive and diesel technology trade;
- the principles of internal combustion engines, different drive trains, gear boxes, hydraulic systems, and electrical systems;
- computer hardware and software;
- the principles of automotive computer technology, diagnostics, and repair methods;
- occupational hazards and safety precautions of the mechanics' trade;
- variances of design among manufacturers;
- electrical monitors and meters;
- welding technology;
- safe handling and disposal methods for hazardous materials;
- human relations sufficient to establish working relationships with coworkers and customers.

Ability to:

- diagnose malfunctions and determine corrective actions;
- operate computer software applications;
- diagnose and resolve network problems;
- read and interpret schematics, blueprints, and manuals;

- determine necessary tensile strength of fabricated parts;
- operate diagnostic equipment and interpret results;
- visualize an end product from an idea;
- operate equipment and determine if it is functional and safe;
- weld;
- use a variety of machine shop tools and equipment;
- establish working relationships with coworkers and customers.

J. Licenses and Certificates:

(Used for announcement purposes only.)

Incumbents must have a valid driver's license and must have or obtain a valid commercial driver's license (CDL) within sixty days of hire date to retain employment. The incumbent must have a Class A CDL with the tanker endorsement and no restrictions in order to operate any Class A vehicle that is a truck-tractor/semi-trailer, with manual transmission. The CDL must include an N endorsement (tank vehicle) for specific positions and must have no transmission restrictions.