

Instructional Terminology

Medium/Heavy Vehicle and Truck Technology – 47.0613.00



ARIZONA DEPARTMENT OF
EDUCATION



This **Instructional Terminology** defines entry-level industry terms identified by the program's Technical Standards, Measurement Criteria, and Instructional Framework. This resource is designed for use in classroom and laboratory environments to ensure students are introduced to the essential occupational terminology relevant to their program. It supports the consistent use of terms and definitions in curriculum, instruction, and assessment and corresponds with the Technical Standards endorsed in January 24, 2024.

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A

Actuator - A device that delivers motion in response to an electrical signal

Actuator test - A diagnostic procedure using a scan tool to activate system components individually for testing

Additive - A product added to a material that will improve a certain characteristic of the material

Air bags - Rubber bellows inflated by air pressure to support and stabilize heavy truck suspensions

Air brakes - A system that utilizes compressed air to activate the brakes

Air compressor - The engine-driven pump that generates air pressure for braking and accessory systems

Air drier - A filtration component that removes moisture and contaminants to prevent brake system issues

Air governor - A control valve that regulates when the air compressor cuts in and out to maintain proper system pressure

Air hoses - Air lines between the tractor and trailer that supply air to the trailer brakes

Air induction system - The set of components that direct filtered air into the engine for combustion

Air shifting - The process that uses air pressure to engage different range combinations in the transmission auxiliary section without a mechanical linkage to the driver

Air spring - Air-filled device that functions as the spring on axles that utilize air pressure in the suspension system; also called air bags

Air tank - A device which stores compressed air for use in the vehicle's braking and auxiliary systems

Alternator - A part that converts mechanical energy into electrical energy to charge the battery and power vehicle electronics

Amperage - The measure of electric current flow through a circuit, expressed in amps

Anchor pins - Pivot points in drum brakes that hold brake shoes in position

Anchor plate - The stationary part of a drum brake assembly that supports brake shoes and hardware

Anti-Lock Brake System (ABS) - A computerized system that prevents wheel lock-up during braking, maintaining steering control

Antifreeze - A material such as alcohol, glycerin, etc. that is added to water to lower its freezing point

Automatic Traction Control (ATC) - System that prevents wheel spin by adjusting engine power or braking

Axle seat - Suspension component used to locate spring on axle (formerly called spring chair)

Axle shaft - A rotating shaft that transfers torque from the differential to the wheel

B

Backing plate - A metal plate that serves as the foundation for the brake shoes and other drum brake hardware

Battery capacity test - A procedure which measures a battery's actual capacity by fully charging it, applying a controlled load, and measuring the total amp

Bearing - A device that allows parts to rotate or move with minimal friction

Bearing cap - A removable cover that keeps oil and grease in and dirt out

Bleeding - The process of removing trapped air or condensation

Bleeder screw - A valve used to expel trapped air from a hydraulic system

Block heater - An electric heating element that warms the engine coolant or oil in cold weather

Bracket - An attachment used to secure parts to the body or frame

Brake balance - The even distribution of braking force between front and rear wheels

Brake chamber - A component in a heavy-duty vehicle's air brake system that converts compressed air into mechanical force to apply the brakes

Brake drum - A type of brake system that forces brake shoes against the inside of a brake drum

Brake fade - A temporary loss of braking effectiveness due to excessive heat

Brake lining - The friction material that withstands high temperatures and pressure, bonded to brake shoes or pads that makes contact to stop motion

Brake rotor - The main rotating part of a disc brake system

Brake spider - The foundation for brake assemblies that supports the various components

Bump steer - Erratic steering caused from rolling over bumps, cornering, or heavy braking; also known as orbital steer and roll steer

Bus network - A communication system that allows vehicle control modules to exchange information

Bushing - The internal lining or sleeve for a cylinder, used to decrease abrasion

C

Cam follower - A specialized type of roller or needle bearing designed to follow cam lobe profiles; also known as a track follower

Camber - The inward or outward tilt of a wheel which affects tire wear and alignment

Camshaft (S - Cam) - A critical component in the air brake system of heavy vehicles

Carbon Monoxide (CO) - A dangerous exhaust gas formed by incomplete combustion

Castor - The forward or rearward tilt of the steering axis which affects directional stability

Center of gravity - The point around which the weight of a truck is evenly distributed; the point of balance

Check valve - A valve that allows fluid or air flow in one direction only

Circuit breaker - Protects an electrical circuit from overload by automatically opening it

Circuit tester - A handheld device for checking voltage or continuity in a circuit

Clutch - Component that connects and disconnects engine power to the transmission

Clutch brake - A small frictional brake mounted on the input shaft which slows down or stops the rotation of transmission input shaft

Combination - A truck coupled to one or more trailers

Compression brake - A type of brake that uses engine compression to slow the vehicle instead of traditional friction brakes; also known as a Jake brake

Conductor - Any material that permits the electrical current to flow easily

Coolant - Fluid that circulates through the engine to absorb and transfer heat

Coolant recovery tank - A reservoir that stores expanding coolant and returns it to the radiator as temperatures fall

Coolant system - Complete system for circulating coolant

Crankcase - The area of the cylinder block below the cylinders and bordered below by the oil pan sump

Cranking circuit - The starter motor electrical path that turns the engine over to start it

Crankshaft - The main rotating shaft that converts piston movement into rotational power

Cross member - A frame component that adds structural strength and supports the drivetrain

Cylinder glazing - Lubricating oil baked on the cylinder wall and filling the crosshatch

Cylinder head - Component that sits atop the engine block, sealing the combustion chamber and housing valves

Cylinder liner - A replaceable metal sleeve that forms the inner wall of a cylinder in a diesel engine

Cylinder pressure test - A diagnostic test that measures compression within engine cylinders

D

Dash control valves - A variety of hand-operated brake valves located on the dash such as parking brake valves, tractor protection valves, and differential lock

Dead axle - An axle that does not rotate but merely forms a base on which to attach the wheels

Diesel Exhaust Fluid (DEF) - A mixture of water and urea that is used to generate ammonia, a reducing agent for SCR technology

Diagnostic connector - The interface plug where a scan tool connects to the vehicle's computer system

Differential - A gear assembly that transmits power from the drive shaft to the wheels and allows two opposite wheels to turn at different speeds

Differential lock - A control that temporarily locks both drive wheels together for maximum traction

Digital Multimeter (DMM) - A tool that measures voltage, resistance, and current in electrical systems

Diode - An electrical component that allows current to flow in one direction only

DMM reading - A numerical output from the digital multimeter showing an electrical measurement

Department of Transportation (DOT) - A government agency that establishes vehicle standards

Diesel Particulate Filter (DPF) - Component that captures soot particles from diesel exhaust to reduce emissions

Drive axle - A part that transfers power from the engine and transmission to the wheels, enabling a vehicle to move

Drive belt tensioner - A spring-loaded pulley that maintains proper tension on serpentine or accessory belts

Drive flange - A component that bolts to a vehicle's wheel hub or axle to transfer rotational power

Drive line - Elements such as the propeller or drive shaft, universal joints, etc. that link the transmission output to the axles pinion gear shaft

Drive shaft phasing - The alignment of drive shaft yokes to ensure smooth power transfer and reduce vibration

Driveshaft - A rotating shaft transmitting torque from the transmission to the differential

Drop voltage test - A process to measure the loss of voltage along a wire or connection under load

Dynamic brake system - A braking method using resistance or engine load rather than friction brakes

E

Engine Control Module (ECM) - An electronic control device to manage engine operation

Exhaust Gas Recirculation (EGR) - A NOx-reducing technology that mixes exhaust gas with fresh intake air

Electric Power Assisted Steering (EPAS) - A steering system that uses an electric motor to help the driver turn the wheels more easily

Electrical circuit - A complete loop allowing current to flow to and from components

Electronic Stability Control (ESC) - A system which helps prevent skidding or rollovers by selectively braking wheels

Electromagnetic Fields (EMFs) - Invisible areas of energy (radiation) produced by natural sources (earth, sun) and man-made electrical devices

Exhaust after-treatment system - The collection of devices (DPF, SCR, DEF) that clean exhaust gases

Exhaust brake - A valve system that creates back pressure to help slow the vehicle

F

Fan clutch - Component that controls when the engine cooling fan engages to manage temperature efficiently

Fan shroud - A cover directing airflow across the radiator for more efficient cooling

Fifth wheel - The large coupling plate that connects tractor to trailer

Filter element - The replaceable material inside an air, oil, or fuel filter that traps contaminants

Final drive - The last reduction gear set of a truck

Foot valve - The foot-operated brake valve that controls air pressure to the service chambers; also known as treadle valve or application valve

Fuel heater - A device that warms the fuel to prevent clogged lines

Fuse - A safety device that melts when current exceeds safe levels, breaking the circuit

Fuse/fusible link - A short section of wire designed to melt and protect circuits from overload

G

Glad hands - Quick-connect couplings for air brake hoses between tractor and trailer

Ground side switching - A circuit design where the ground connection controls power flow

H

Hand valve - A valve mounted on the steering column or dash; used by the driver to apply trailer brakes independently of the tractor

Harness - A bundle of electrical wires that distribute current to components

Harness connector - The plug assembly joining wiring harness sections together

Helper spring - An additional spring device that permits greater load on an axle

Hybrid - A vehicle that uses both an internal combustion engine and an electric motor for power

Hydraulic brake - A braking mechanism that uses pressurized, incompressible brake fluid to transfer the force from the driver's pedal to the friction components at the wheels

Hydraulic line - A hose or tube carrying pressurized fluid within braking or steering systems

Hydraulic power steering - A steering system utilizing hydraulic pressure to reduce the turning effort required of the operator

I

Idle speed - The speed at which the engine runs when not under load

Ignition coil - An induction coil that steps up battery voltage to the high voltage used in the secondary ignition system

Indicator lamp - A warning or status light on the instrument cluster

Injector - Component that precisely sprays fuel into each cylinder for combustion

Insulator - A nonconductive material that stops the flow of energy

Intercooler - A cooler that reduces the temperature of air entering the engine after compression by the turbocharger

J

Jack stand - A fixed support used to safely hold a lifted vehicle

Jake brake - A device used to slow the truck by closing off the exhaust pipe; named for the inventor, Jacobs

K

Kingpin - The main pivot in the steering mechanism of a truck or other vehicle

L

Landing gear - Retractable supports for a semi-trailer to keep the trailer level when the truck-tractor is detached

Leak test - A procedure to identify escaping air, fuel, or fluid in a system

Leak-down test - A procedure that measures how much pressure an engine cylinder loses, indicating wear or damage

Load-sensing valve - A hydraulic control device that regulates brake fluid pressure to the rear wheels based on the vehicle's payload

Low Voltage Disconnect (LVD) - System that automatically shuts off low-priority systems when battery voltage drops too low

M

Magnetic pickup - A sensor that reads rotational speed from a metal target wheel or gear tooth

Manifold - System that channels air or exhaust gases into or out of engine cylinders

Manifold pressure sensor - Component that measures the air pressure inside the intake manifold for engine control

Master cylinder - A control device that converts force into hydraulic pressure

Metering - A measurement of the correct quantity of fuel for each cylinder

Micrometer - A precision tool for measuring very small distances or part thickness

N

Neutral safety switch - Device that prevents engine starting unless the transmission is in neutral or park

Nos sensor - Sensor that detects oxygen ions originating from nitric oxide from other oxygen molecules

O

Ohm's law - The concept that electric current conducted between

two points is directly proportional to the voltage across the two points

Open circuit - An incomplete path preventing current flow in an electrical system

Occupational Safety and Health Administration (OSHA) - A federal agency that sets and enforces workplace safety standards

Over-running clutch - A design that allows the rotating component to spin faster than the actual driving component that is producing the driving force

Over crank protection - A feature that prevents starter damage from excessive cranking

P

Parallel circuit - An electrical circuit with multiple current paths for reliability and even voltage distribution

Parasitic draw - Process of a vehicle's electrical system continuously drawing power from the battery even when the car is off, which can lead to a dead battery

Parking brake - A mechanically applied brake used to prevent a parked vehicle movement

Pedal travel - The distance the brake or clutch pedal moves when pressed

Pintle hook - A heavy-duty hitch used for connecting trucks and trailers

Pitman arm - A feature that transmits steering motion from the gearbox to the steering linkage

Power divider - A mechanism in multi-drive axle vehicles (such as tandem-axle trucks) that splits power between different axle groups

Pressure - The amount of force applied to a defined area, which is measured in pounds per square inch (PSI)

Pressure differential - The difference in pressure between any two points of a system or a component

Pressure differential valve - A component that maintains a constant pressure differential between any two pressure points in a system to maintain constant pressure

Pressure regulator - A component that maintains consistent pressure within fuel, air, or hydraulic systems

Pressure relief valve - Part of a wet tank that limits system pressure if the compressor or governor unloader valve malfunctions

Pressure switch - A device that opens or closes a circuit when a certain pressure level is reached

Pump drive - The mechanical linkage that connects a fuel or oil pump to the engine

Q

Quick release valve - The feature that speeds up the release of air pressure in air brake chambers for faster brake release

R

Radiator - A component that transfers heat from coolant to outside air to maintain proper engine temperature

Regenerative braking system - A system that slows a vehicle by

creating magnetic resistance while converting kinetic energy into electrical energy that is returned to the battery

Relay - Uses a low-current signal to control a high-current circuit

Relay valve - A unit that controls air pressure to multiple brake chambers in response to brake pedal input

Residual pressure valve - A unit that maintains slight pressure in brake lines to reduce pedal travel and delay

Resistance - Opposition to the flow of electric current in a circuit

Restriction gauge - Pressure sensors that measure the negative pressure between the air filter and the turbocharger

Rollers - A part that attaches to the web of the brake shoes via roller retainers; also known as brake shoe rollers

Runout - The amount of wobble in a rotating component

S

Safety Data Sheet (SDS) - Provides information about handling, hazards, and safety measures for chemicals

Scan tool - A diagnostic tool that reads and clears trouble codes from vehicle control modules

Selective Catalytic Reduction (SCR) - An emissions control system for diesel engines

Sealed connector - A wiring connection with moisture protection for reliability in harsh environments

Sensor - An element that detects physical conditions such as temperature or pressure and sends data to the ECM

Series circuit - An electrical circuit where current flows through one path only

Series turbocharging - Method of using two differently sized turbochargers where the compressor outlet is connected to the inlet of a second compressor

Shift rail - A guide for the shift forks using a series of grooves, tension balls and springs to hold the shift fork in gear

Shift tower - Main interface between the driver and the transmission consisting of a gearshift lever, pivot pin spring, boot and housing

Short circuit - An unintended low-resistance path causing excessive current flow

Short to voltage - An electrical fault where a circuit connects to a voltage source it should not be connected to

Slack adjuster - Mechanical links between the brake-chamber push rod and the camshaft on cam-type brakes

Slide travel - The distance that a sliding fifth wheel is designed to move

Sliding fifth wheel - A specialized design that provides relocation of the kingpin, which affects the weight distributed on the tractor axles and or overall length of the tractor and trailer

Solenoid - An electromagnetic switch that converts electrical energy into mechanical movement

Speed sensor - An element that detects wheel or shaft rotation speed for ABS or transmission control

Spin on filter - Filter media enclosed in a metal can that is threaded onto a filter header

Spring brake - Style of brake that uses a large spring to apply parking brakes when air pressure is released

Spring deflection - A depression of a trailer suspension when the springs are placed under a load

Spring rate - A load required to deflect the spring a given distance, usually one inch

Spring spacer - A riser block often used on top of the spring seat to obtain increased mounting height

Springs - Devices used to reduce road shocks and transfer loads through suspension components to the frame of the trailer

Stability - A relative measure of the handling characteristics which provides the desired and safe operation of the vehicle during various maneuvers

Starter motor - Unit that converts electrical energy from the battery into mechanical rotation to start the engine

Steering Axis Inclination (SAI) - The inward tilt of the steering pivot points, affecting return-to-center action

Steering gear - A gear set mounted in a housing that is fastened to the lower end of the steering column to multiply driver turning force and change rotary motion into longitudinal motion

Supply voltage - The amount of voltage a system provides

Suspension - The attachment of an axle to the vehicle's frame to dampen road shocks through springs (leaf, air, torsion, or other), thus reducing the force entering the frame

Suspension arm - Component that connects the wheel assembly to the frame and allows controlled motion

Suspension equalizer - System that balances load distribution between axles on tandem suspension systems

T

Tag axle - The rearmost axle on a tandem axle tractor for increasing the load-carrying capacity of the vehicle

Tandem - Two items directly one in front of the other and working together

Tandem axle suspension - A suspension consisting of two axles with a means of equalizing weight between axles

Tandem drive - A two-axle drive combination

Thermal breaker - A circuit protection device that trips when excessive heat is detected

Thermostat - A device that controls coolant flow to maintain optimal engine operating temperature

Torque - To tighten a fastener to a specific degree of tightness in a given order or pattern if multiple fasteners are involved in a single component

Torque arm - A suspension component controlling axle rotation and alignment

Torque converter - Unit that transfers rotating power from the engine to the transmission fluid

Torque wrench - A precision tool that tightens bolts to a specified torque value

Track bar - A suspension link that provides lateral location of the axle

Tracking - The travel of the rear wheel in a parallel path with the front tires

Tractor - A motor vehicle without a body that has a 5th wheel and is used for pulling a semi-trailer

Trailer - A platform or container on wheels pulled by a truck or tractor

Trailer protection valve - Unit that prevents air loss from the tractor in the event of trailer brake failure

Transmission - A device used to transmit torque at various ratios that can usually change the direction of the force of rotation

Turbocharger - An exhaust-driven device that compresses air to pressurize the air intake of an engine

Turbocharger spooling - The process where a turbocharger turbine accelerates speed due to increased fuel delivery and air flow into the engine

U

U-bolt - A fastener used to clamp the top U-bolt plate, spring axle, and bottom U-bolt plate together around the axle

V

Valve train - The assembly of parts that open and close intake and exhaust valves in the engine

Voltage - A measure of electrical pressure

Voltage drop test - A test using a voltmeter to measure the voltage drop between two points in a circuit while current is flowing

Volt drop - The difference in voltage measured across a component or wire under load

Volt meter - An instrument for measuring electrical potential difference

Volts - The unit used to measure electrical pressure

W

Water pump - Unit that circulates coolant through the engine and radiator

Wet sleeve block - A block designed with larger holes into which the cylinder sleeves are inserted

Wet tank - An air supply reservoir

Wheel alignment - The process of keeping all the parts of the steering system in proper relation to each other

Wheel bearing - A piece that allows the wheel to spin smoothly with minimal friction

Wiring diagram - A schematic map showing electrical paths and connections in a system

Wiring harness - An organized bundle of wires connecting various electrical components and systems

X

Y

Z