

Northeast South Dakota Head Start Program, Inc.

Vehicle Care and Policies Manual

2008-2009



Roadside Chat

Ever been mortified to find your favorite mechanic grinning as you tried to explain exactly what happened when your vehicle “just went pffft” and it wouldn’t start again?

If we’re honest, most of us will have to admit that we do drive a vehicle day after day, mile after mile, in blissful ignorance of what makes a vehicle tick.

This ignorance could lead to trouble. If a vehicle isn’t kept in good repair, it’s not safe to drive. A vehicle that isn’t properly maintained is expensive to operate. It becomes a drain on the program budget. It is extremely expensive to replace an engine that burned out because you forgot to change the oil in proper intervals or to even have the oil level checked.

So, this little booklet is written to provide you with some basic information about the vehicles driven for the NESD Head Start Program, Inc.

What Makes the Vehicle Go?

Step on the gas and AWAY you go.....but how? It takes more than 15,000 parts to keep your vehicle in action and you on your merry way to earning your paycheck.

The principle of the thing:

Chances are that the vehicle you drive weighs anywhere from 2,700 lbs to 4,000 lbs. It takes tremendous power to move that much weight on level ground – let alone up steep hills, through dirt, mud and sand, and over ice and snow. Likewise, it is just as important to remember that it takes power to control, slow and stop this much weight once it is moving.

Power is produced by your vehicle by a series of rapid-fire fuel explosions taking place within the engine. As fast as these explosions create the power, it is harnessed and sent to the cranks, gears and shafts. There it is put to work to turn the wheels forward or backward, whichever way you want to go. Thus the principle on which the vehicle runs is a simple one: the creation of power – and the transfer of that power into the movement of the wheels.

Give it gas:

The explosions that power your vehicle take place in the cylinders. Every car has four, six, eight or more cylinders, depending on the model. Several thousand explosions occur in split-second sequence every minute, depending on how fast the vehicle is going.

Each of these explosions is created by igniting a mixture of gas and air. Since gasoline won’t burn explosively without oxygen, it is carefully mixed with just the right amount of air to form a fine vapor – which can be exploded. This mixing is done in the carburetor; then the fuel-vapor is drawn into the cylinders to be exploded. You control the amount of

mixture going into the cylinders by “stepping on the gas.” The more powerful the explosions, the faster the vehicle moves.

On all cylinders:

If you lift up the hood of the vehicle, you’ll probably find what at first looks like a solid block of metal. This is the “engine block” – but it is not solid. Instead, it houses many vital parts, including the cylinders where the power explosions take place.

Shaped something like an old fashioned butter churn, the cylinders are hollow tubes or chambers. At the top of each cylinder, a spark plug is screwed firmly into place.

Only the bottom closure of the cylinder is designed to move or “give” with the force of the burning fuel. Called the piston, this base works up and down snugly within the cylinder walls, like a movable floor. When your car is running perfectly, each piston glides smoothly up and down....up and down....in smooth, powerful rhythm with the explosion.

That vital spark:

It takes four strokes of the piston to complete each explosive cycle. First, it goes down, drawing the gas-and-air vapor into the cylinder. Then up it pushes on the second strike, tapping the vapor and forcing it tighter and tighter against the cylinder top.

With no place to escape, the captured vapor is squeezed and squeezed until it is ready to explode. But even so, it still will not “go off” by itself. So it is at this precise moment that the mighty spark plug comes in to play! With split-second timing, the spark plug ignites the mixture with a quick stab of electricity....and BOOM!....the explosion takes place.

Where does this essential spark come from when it is needed? Each spark plug is connected by wires with the ignition system of your vehicle....and a steady stream of electricity keeps flowing to the plugs when your engine is running.

On the bottom of the spark plug, two little metallic points extend down inside the cylinder. These two points do not quite touch – instead a very tiny space is deliberately left between them. As the high voltage electricity flows into the plug, the current must jump the gap from one point to another. A power spark results.

Down and Out:

With the explosion of the fuel charge comes the third stroke of the piston. Downward it is driven with tremendous force, sent plunging by the powerful impact of the explosion! It is this forceful down stroke that will now be “harnessed” to transfer the power of the explosion to your vehicle’s wheels.

Then the piston returns to the top of the cylinder to complete the four-stroke cycle. This time its job is to force the burned gases out, so that the cycle can repeat. The burned

gases escape through a carefully synchronized exhaust valve....and are piped under your vehicle to the great outdoors via the muffler and tail pipe.

Hitching Up the Horsepower:

Just as the down stroke of your hand on an egg beater handle forces a series of connecting gears to turn the blades of the egg beater, so the powerful down stroke of the piston rotates a series of shafts and gears that eventually turn the vehicles wheels since each piston is fastened by “connecting rods” to a crankshaft that lies beneath the cylinders. This crankshaft revolves rhythmically as each fuel ignition drives a piston downward to turn it – thus starting the flow of power to the wheels of the vehicle.

Linked to the crankshaft is the transmission. The transmission houses the gear-shifting mechanism of the vehicle. As you drive along, the transmission gears are shifted (either manually or automatically) in accordance with your speed....meshing in different positions to allow you to go faster or slower, or forward or backward.

Next comes the long driveshaft, which runs from the transmission box all the way back to the rear axle. When your vehicle is “in gear,” the driveshaft revolves with the crankshaft....relaying the power to your wheels. But still the wheels will not turn until the power has flowed through two more sets of gears!

The final link:

Located on the rear axle, the first of these gear arrangements accomplishes the amazing task of changing the direction of the power. Until this time, all motion has been at right angles with the wheels. But now, an ingeniously meshed pinion and ring gear changes the sideways rotation of the drive shaft to a forward or backward turning motion of the wheels. Simultaneously, the second set of gears, called the differential, “sorts out” the turning motion, enabling the two rear wheels to move at different rates of speed. Thus when you go around corners, the two rear wheels are like the inside and outside skaters in “snap-the-whip” – one going faster than the other and traveling a greater distance.

The transmission of power has now been completed – the vehicle is yours to command and CONTROL!

What It Is and What It Does!

Muffler – a gadget that decreases the noise as the burned gases from the cylinders are piped beneath the vehicle. A damaged muffler or tail pipe can be deadly serious – as carbon monoxide can seep into the vehicle body through leaks or breaks.

Distributor – a unit of the ignition system which distributes electric current from battery to spark plugs. The terminals, or “points,” of the distributor should be checked from time to time. If carbon collects, electricity may not flow through, and then spark plugs may misfire.

Piston Rings – slender little bands that circle the piston snugly to make a tight seal between the piston and cylinder wall. For efficient operation, these rings should be replaced when worn.

Spark Plugs – provide the vital sparks, with split-second timing, to fire the fuel and have a great deal to do with the smooth operation of the vehicle in general. They really “take it” too – in 10,000 miles of average driving, high voltage electricity snaps across each plug’s electrode 15 million times! Hammered by compression the same number of times....subjected to extreme heat and frequently soaked with oil....the spark plug still must hold an adjustment measured in thousandths of an inch.

Watch Those Signals!

At least three vital indicators are on your vehicle's instrument panel to warn you of possible engine trouble. Check these indicators constantly to forestall costly breakdowns!

Ampmeter – the source of electrical current in your vehicle is the generator. Voltage produced by the generator is stored in the battery – from which it flows to the ignition, lights, horn, etc. Depending upon the make of the vehicle, the dashboard has some kind of instrument to let you know if the current is being used faster than the generator can produce it. For example: “discharge” on one type means trouble is brewing. “Charge” shows the system is working properly.

Temperature – when the engine runs, cylinder temperatures could get hot enough to melt iron! So water is pumped constantly around the engine to cool the hot parts. Returned to the radiator, the water is re-cooled by outside air. A fan turned by a belt from the crankshaft pulls the air in and also blows heat out. The dashboard gauge indicates the water temperature. Look for trouble immediately if it soars!

Oil Pressure – rapidly moving parts....rubbing together continuously....would wear themselves out quickly if it were not for oil. Stored underneath the crankshaft, lubricating oil is pumped to all vital parts to keep them operating smoothly. The oil indicator tells you whether proper pressure is being maintained to send the oil where it is needed. Without oil, the engine will be ruined within a few miles of driving!

Listen – Your Vehicle Will Speak!

Vehicles can tell you when they need attention – in a colorful language of their own!

Here is a brief way to decipher your vehicle's complaints:

Listen – is your vehicle talking to you? No, carburetors can't speak English and your generator never took Spanish lessons – but every vehicle does “speak” a language all its own – and can tell you its troubles once you learn to understand the language. It is your vehicle's way of doing you a favor – warning you that it is time for a service stop before more serious trouble arises.

To help you translate your vehicle's squawks and “backtalk” – here is a simplified dictionary of automotive “speech” –

Do you hear a high-pitched, rhymical chirping like a nestful of hungry robins? It's probably a dry fan belt – an easy matter for a reliable mechanic to silence.

Sometimes the chirping can be the more serious wail of forgotten generator bearings lack of lubricant. A mechanic knows how to “feed” the vehicle the oil and bring soothing relief to your ears.

If the engine misses or idles roughly on a wet morning, you'll probably hear of “snick-snick” noise under the hood. It sounds like a loud cricket or the breaking of a twig. This is the sound an electric spark makes when it jumps from a damp spark plug wire to ground on the engine block. Rather than fool around with the wiring yourself, let a trained mechanic make sure everything is dry and shipshape – and at the same time, have the spark plugs checked.

A startling sound like a woodpecker gone berserk on a metal door, particularly when the engine is cold in the morning, is not an indication of imminent disaster, but very likely just a sticky hydraulic valve lifter. Usually it can be readily silenced by a change to fresh detergent oil and / or a special oil additive. However, if the vehicle has solid tappets – and many high performance vehicles now do – an adjustment is probably necessary.

Did you ever toss a handful of BB's down a rainspout? Anyway, you can imagine the racket! If you hear one like it from the engine when accelerating or climbing a hill, you've probably got pre-ignition or spark knock. The cause can be use of “regular” grade fuel in an engine that's designed for higher octane fuel, improperly adjusted ignition timing, or deposits of carbon in the engine's combustion chambers that act as unwanted spark plugs. If you know you're using the correct fuel, better let the mechanic check into the cause of the knock. Otherwise you will be wasting fuel!

Another bird's chirp – this time beneath the vehicle – can be caused by a dry pinion bearing seal at the rear axle. Prompt servicing can restore peace and quiet.

If, when applying the brakes lightly, you detect the sound of someone scuffing a shoe on a doormat, it could be an out-of-round (slightly oval) brake drum rubbing high spots on the brake shoes. This is a condition rarely found on new vehicles, but it is a sure sign of hard wear on a used vehicle.

When you come to a halt after a long, hot drive, do you hear the shrilling of a peanut whistle accompanied by a dyspeptic rumbling under the hood? If so, you can bet you've got an over-heated engine. This is usually caused either by too little fluid in the radiator or improper fan belt operation. If, when the engine is shut off, the fan is fairly easy to turn by hand, then the belt is too loose. A fan belt must be quite tight. An experienced mechanic can tell you whether it's tight enough. If you're low on radiator fluid, first let the engine cool down. Then open the radiator pressure cap carefully and check the fluid level. If you need water or coolant, add it slowly while the engine is idling. Or take the vehicle to a trusted mechanic.

Do you hear the squeal of a frightened pig when you first touch the brakes in the morning? It could mean that your brake linings are prone to squeak when cold and damp. But if you hear the noise repeatedly, better have the linings checked.

When you take your foot off the accelerator at medium speeds, do you hear a noise at the rear of the vehicle that sounds like the whine of an overage coffee grinder? Most likely the cause is worn rear axle gears. It must be checked by a mechanic immediately.

A dull, thudding noise beneath the vehicle when you're driving down one of the bumpy, dusty back roads in the Program area, may sound exactly like a friendly dog thumping it's tail on a wooden floor. It's probably the exhaust pipe and muffler banging up against the body or frame of the vehicle as a result of loose or broken mounting straps. What you probably need is either tightening or replacement of the straps. Both can be repaired at an auto engine repair shop.

The "clonk" of a cowbell, emanating from beneath the vehicle's floor as you ride on rough pavement, is often caused by a shock absorber that's loose due to worn rubber bushings. Replacement of the bushings should put things back in good shape.

Listening to these warning signals from the vehicle will warn you of minor repairs needed before they become major. Learning to listen when the vehicle "speaks" can save a lot of headaches and a great deal of additional expense.

How To Keep Your Car On the GO!

Be sure to have your favorite service station or garage check your vehicle regularly to keep it functioning smoothly – these check ups help you avoid costly repair jobs. Meantime here are some basic maintenance rules to follow for safer, more economical driving:

- Have the oil supply checked frequently.
- Check water in the battery if it is required (some batteries are self-contained).
- Be sure there is always sufficient water / coolant in the radiator.
- Keep proper amount of air in the tires – check the tire pressure regularly.
- Have brakes checked regularly. (Almost 1/3 of all cars tested have faulty brakes! Always be sure you can count on yours!)
- Change the oil and oil filter at regular intervals (3,000 – 3,500 miles is recommended).
- Have anti-freeze installed in fall, before winter months.
- Clean cooling system if necessary.

Tire Care

These simple rules will help prevent costly tire inflation failures:

- Make certain that tires are kept inflated to recommended pressure. Check tires at least once a week. Inflate tires when they are cool.
- Never try to make old tire valve cores do the job. Replace them with new ones.
- See that valve caps are kept screwed on finger-tight.
- Check for slow leaks whenever air pressure shows a decided drop. Repair slow leaks immediately.
- Do not reduce the pressure which sometimes builds up after the vehicle has been driven. “Bleeding” of tires causes a dangerous increase in engine temperature and the tires will also then be badly under-inflated when cool.

Tips on how to get the longest possible tread wear from tires:

- Keep tires properly inflated – check regularly.
- Keep wheels in alignment – if tires are wearing unevenly, consult a competent serviceperson regarding alignment of both front and rear tires.
- Keep spare tire ready for possible use.
- Rotate tires regularly.
- Keep brakes properly adjusted.

When a vehicle has a tendency to shimmy or vibrate, chances are that at least part of the cause is due to the wheels being out of balance. Another indication of improper wheel balance is rapid and spotty wear appearing on tires as a result of the road friction caused

by “wobbling” of the wheels. If unbalanced wheels are suspected, the vehicle should be taken to a garage or service station which has the proper balancing equipment.

Unbalanced wheels can cause these troubles:

- Vibration may affect the steering mechanism.
- Shock absorber links may be loosened.
- Frame and body of the car may be loosened.
- Grease and oil may be pounded out.
- Uniform and effective brake application may be impaired.

Proper wheel balance pays many times over because it:

- Reduces spotty wear.
- Improves tire mileage.
- Assures smooth and quiet vehicle operation.
- Reduces wear and tear on the vehicle.
- Makes for safe and comfortable driving.

NESD Head Start Vehicle Maintenance

As the driver of a vehicle from the NESD Head Start Program, Inc., you have the responsibilities of maintaining the Head Start vehicle assigned to you.

You are responsible for the following:

- Check oil at least once weekly before starting the vehicle.
- Have the oil and oil filter changed every 3,000 – 3,500 miles.
- ALL repair charge slips must be signed by the driver of the vehicle.
- All charge slips for fuel / car washes / oil must be signed by the driver and include the current mileage and license number of the vehicle.
- You are also required to register each transaction in the vehicle report book, which stays with the vehicle.
- Tires should be rotated at least every 5,000 miles or sooner if irregular wear develops.
- Fill out a monthly vehicle expense report – along with ALL receipts for that month.
- Wash vehicle when needed – excessive washing is not necessary.
- Keep interior of vehicle clean – unannounced inspections may occur.
- All repairs must be approved by the Transportation Manager and a Purchase Order number must be given.
- Low-beam headlights must be used during inclement or low-visibility weather.
- Watch tire alignment closely – check every 6 months.
- Watch temperature / oil gauges or lights closely. Stop immediately if vehicle gets hot or oil pressure drops. This action will avoid excessive damage to the vehicle.
- Passengers are not allowed in Head Start vehicles (except buses) without prior approval from the Transportation Manager. The approval is only for a “one-time” basis only – it is not a “blanket approval” for extended periods.
- Vehicles should be driven only by the Head Start staff person assigned to that vehicle.
- In the case of an accident, a “Vehicle Accident Report” form must be completed by the driver of the vehicle as soon as possible.

Whenever you are involved in an accident with a Head Start vehicle, law enforcement (Police, Sheriff, or Highway Patrol) MUST be notified at the time of the accident. Do not drive away with the intent you will report it when you get to work, home or your destination as you may be cited for “leaving the scene of an accident.”

In the case of hitting a wild animal (deer, etc.) or domestic animal (horse, cow, pig), as soon as the collision occurs, call your local dispatch center to notify them. The Dispatcher may want you to call them again when you arrive at your destination for more information and a report.

Vehicle Maintenance Schedule

<u>Item</u>	<u>Check</u>	<u>Service</u>
Tires: Visual Check	Daily	When Needed or Advice of Mechanic (AOM)
Tires: Pressure – Wear	Weekly	When Needed or AOM
Tires: Rotate		Every 5,000 miles
Oil, Lube and Filter	Cold Engine (weekly)	3,000 – 3,500 miles
Wheel Alignment	Every 6 months	When problems or AOM
Automatic Transmission Fluid	Engine Idling (weekly)	30,000 miles
Power Steering Fluid	Weekly	Add When Needed
Windshield Washer Fluid	Monthly	Add When Needed
Brake Fluid (Sometimes the auto. transmission fluid, power steering fluid, windshield washer fluid and brake fluid are checked by mechanics during regular oil changes.)	With Oil Change	Add As Needed
Exhaust System	Monthly	When Needed
Radiator Coolant (Should be checked by mechanic during oil changes)	Monthly	2 Years – or 35,000 miles
Belts and Hoses	Weekly	Replace When Needed-AOM
Tune-Up		When Needed or AOM
Brake System	Yearly	When Needed or AOM
Battery	Monthly – Visual Yearly – Tested	When Needed or AOM
Air Filter	Inspected during Oil Change	
Shock Absorbers	Action Leaks – Monthly	AOM
Air Conditioning	Yearly	When Needed
Fuel Filter		When Needed or AOM

RECEIPT OF:

VEHICLE CARE AND POLICIES MANUAL

For The

Northeast South Dakota Head Start Program, Inc.

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July – 2007

I have read and understand the Vehicle Care and Policies Manual.

Employee Signature

Date

Supervisor

Date