

Bass Tire and Automotive Basic Training Manual



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Purpose of this Book

The purpose of this book is to grow and improve the field of Automobile Technicians. As the older skilled technicians in all of the trades retire, there is a shortage in the workforce in all fields where craftsmen make a living with their hands. My particular field of expertise is in the Tire and Automobile repair industry. The early chapters in this book will apply to any field of employment. No matter the career path there are basic principles that always apply. Get your highlighter ready while I list the basic principles of employment;

Work Ethic, Honesty, Integrity, Pride in work, Punctual, Be Present, Train in your profession, Be Professional, Be Organized, Time Management, Set Goals, Be an Encourager, Be a Leader, Be Respectful, Be Happy, Learn about Work and family Balance, Never be complacent, Strive to Improve Daily, Read as much as you can about leadership and self improvement, Be a good Communicator, Be a good Steward of your Finances, Hook your caboose to the right train, Smile and be kind to your team mates, A clean work area is a safer work area, Go to work each day prepared, keep your work transportation in top order, Keep license and certifications current, Think like a leader and a business owner, surround yourself by other leaders!

The preceding principles will be vital to your success in any business or employment endeavor you pursue. If you are successful, you will visit this page many many times in your career.

The instructional chapters in this book will cover the basics of a General Service Automobile Technician. Before any Technician can advance to the next level, he or she must grasp the basic auto service skills which you will use throughout your career. Reading and testing may not be everyone's strong suit in life, but being a good reader is an important part of becoming a great technician, as you will be reading work orders and continuing to learn through the technologies that is so vital in the Tire and Automotive industry.

Basic Principles of Employment

- A good solid work ethic is what many employers and business leaders say is lacking today. I agree to a point, but one reason could be that people have not been taught the importance and explained what work ethic really is. Recently I read a story that may explain work ethic as well as I have ever heard it put. It had a picture of a person that was hired to stack firewood. His father had taught him this about work ethic: Show up early to work. Work fast but efficient. Stack the wood very neat and tight. If there is another worker also stacking wood, make sure you out work them and your row of wood is much neater. Secure your wood with a tarp to keep it dry, then go help the other worker complete his task. When finished, find your next assignment.

As simple as that seems, that pretty much sums up what a good solid work ethic is all about. The above described work ethic also covers Pride, being punctual, integrity, encouraging team mates, using time wisely, and thinking like a leader and or an owner. I can assure you, every manager and business owner wants team members with the work ethic and basic principles I have already mentioned. If you have a strong work ethic, it may not take you around the world, but it will take you a far piece down the road.

- You have heard the old saying “Honesty is the best Policy”. Being Truthful and Honest, is not only biblical, but makes us better men and women, better sons and daughters, better citizens, better parents, better teammates and better workers. Being honest is a virtue that will earn the respect of your customers, your teammates, your employer and self respect. With that honesty, integrity comes with it. I guess we all have moved the truth around to suit our narrative at the time to make us look a little better. The fact is if you work hard and are fair, honest and have high integrity, you will not have to move the truth one bit.
- Taking Pride in your work is what separates you from your competition. I saw a slogan on the side of a tractor trailer truck that said; “There are no Shortcuts on the Road to Success”. I tell my teammates to treat every car like it was their grandmothers car. One of the on going struggles in the automobile repair business, is getting grease or smudge finger prints in or on a customers car. Using floor mats, and microfiber cloths to clean where you have touched, leaves a customers car returned to them as clean as you started or better. Take pride to do your very best with each job you do.
- Always be punctual (be present) and not only on time, but early to work. Make sure you have a working alarm clock. At our Bass Tire retail tire and

Basic Principles of Employment

auto service center, we open at 7:30 am. I tell my folks to try to get to work no later than 7:15 am. If you clock in 30 minutes early, you can help get the shop opened up, and ready to start working on customer's cars by 7:30. It will give you extra overtime, and give the store a head start on the days work. You can also have your coffee, use the restroom, plan your day get organized and start your work day on a positive note. If there is a traffic problem, chances are you will still be on time. If you are late, it starts your day behind and will disorganize your work day. Being late also lets down your teammates that depend on you, it also sets a negative impression with your teammates and your manager. It has been my experience that people that have high absenteeism and are late consistently seems to struggle in all aspects of their life. It seems to be the same ones over and over. Strive to not be that guy. The workers that are always on time and rarely miss work, when they are late or absent, you know there is a good reason, and they always get a pass. It is hard to give a pass to the ones that are late more than they are on time. I had a manager tell me one time that the best guy in the world is not very valuable if they aren't here. Dependability is key to a good team.

- Take advantage of training and raise your level of being professional. You want to go to the best trained and most professional doctor if you are sick. Customers want to bring their second most expensive investment to the best trained and most professional technician. Advance Auto Parts Technet program has a vast library of training videos and technology available for technicians to continue to train and learn. Bass Tire has bought ASE study books and will pay our technicians test fee as well as pay their daily rate to test. Part of being professional is a clean uniform at work each day. Customers notice appearance. If you look and act professional, it gives the customer peace of mind that you will take pride and do a 1st class job on their car.
- Be organized and use your time wisely. Keeping your work area clean and organized will make your work flow much easier. Reducing steps looking for what you need to work will improve efficiency and being good at organization will make your work life easier and safer. The tools you use daily should always be organized and accessible. (Never waste steps looking for the tools of your trade). Cluttered work space can cause accidents. I have seen a lot of wasted time in the restroom, on the phones, checking social media, smoking and visiting with coworkers. We are only given so many hours in a day, poor time management sure seems to be a waste. Standing around and too many steps sure use up valuable time. Once you have diagnosed a vehicle, and waiting on parts, that might be a good time for lunch. Having your work board looked at and vision of your next days assignments at quitting time will help get your day off to a good productive start the next day. Avoid the vices such as smoking, drinking alcohol, and anything that would interfere with using your time wisely or that might be a detriment to your health.

Basic Principles of Employment

- Set work and personal goals. My wife and I had a 30 year mortgage that we set a goal to pay off in 20 years, we paid it off in 17 years. We had a goal to educate our children with no college debt. When we accomplished that goal, we set another to help educate someone else children. We have given scholarships ever since. Specific goals with a time of completion is important for everyone. You will never take a trip if you don't know where you are going. Goals are your benchmark or your report card so to speak.
- Be a leader and an encourager. I never quite understood people tearing others down. Teaching and coaching can be done in a manner of encouragement. Coach Bear Bryant would demote players sometimes to see how they would react. He always said people are different and because of that you have to treat them different. He said some needed a kick in the butt and others needed a hug. I don't have the secret sauce of success in managing people, but I have learned leading by example, kindness, being professional, courtesy, respect, happiness, and encouragement are all virtues that is a pretty good place to start.
- Work life and family life balance is always hard to hit the sweet spot. Demands at work and demands at home sometimes will collide. I had a friend and customer when I would ask him how he was, he would reply that hard work was all he knew and that is what made him a dull and boring person. Well I knew him to be a hard worker and never found him to be dull or boring. Maybe he felt deep down that his work life and personal life was off balance. I can say due to the demands of management when working for another company and the work load while building Bass Tire was not in balance. There were family things I missed through the years, but looking back I did what was necessary to provide for the family that I loved enough to work that hard. I have softened my stance on work and family time balance. I want our team to be on time or early, I want them to try to get off close to quitting time, sometimes they may have to stay late, but we have a start time and an end time. Paid time off is important because as much of the balance should be observed. That is why we have sick time and vacation time. I always enjoyed working when I was not at work. Sales and management may have times when it may be necessary to work away from the store, but most technicians other than training, will not require as much of a sacrifice to interfere with family time.
- Learn to be a good reader and a great communicator. Reading will help in training and improving your career to continue to improve and evolve. Being a great communicator will help you to become a super star. People prefer to buy from people they like. People will work harder for people they like and respect. If you can develop your communication skills, you will enjoy more success in life and in business.

Basic Principles of Employment

- Be a good steward of your finances. I had an old friend tell me that getting in the ditch is not a problem, the problem is having the money to get out of the ditch. Live with in your means, spend less than you make. Make wise decisions with your money. Life is easier if you don't get in a situation where every dollar you make is committed.
- Hook your caboose to the right train. You become who you are around. Surround yourself with other hard working friends that share your goals and values. If you are hooked to the right train, they will help pull you up the steepest mountain grade. The wrong train will make you go backwards.
- Keep your work transportation in good mechanical condition. Make sure your tags and insurance are current. After all, you work on cars for a living!
- Go to work each day prepared. Clean uniform, pen, eye protection, lunch, jacket, air gauge and or proper tools to preform your duties. If you are prepared for the days duties, you will find your day will go better and your accomplishments will be greater.
- Think like a leader. Never blame your problems on others. Change your mindset to never worry that a co-worker is not working as hard as you or you are caring too much of the load. I always took pride and was proud that I could do more work than some of my teammates. Work hard, do your best, give 100% effort, and treat every vehicle you touch and every customer, and teammates with courtesy and respect.

Understanding Work Board And Work Flow

Each shop will have a work board with work orders of the vehicles that need service. Each shop will have their own process. Learn the process and follow that process. At Bass Tire, we use color coded sleeves to put the work order with keys.

Black Sleeves: The drop off for service work orders are put in a black sleeve with the keys.

The counter staff will put a time and date the customer expects to have the job complete with a red marker

Red Sleeves: The waiting tickets are placed in a red sleeve also with a time the customer expects to have the job completed. The reason the time should be put on the waiting tickets is so the customer is not surprised if completion time is longer than they might be expecting. Putting the times on the waiting tickets at check in will prepare the customer for the wait.

Green Sleeves: Any comeback where a customer has had service performed and they still have an issue with the vehicle or the work preformed. Red sharpie times and dates should be on these tickets as well.

Bass Tire's work board is divided by whether the job is for the mechanical techs or the general service techs.

The general service techs jobs include but not limited to the following:

Tire Rotations

Wheel Balancing

Oil Changes

Flat Repairs

Digital Vehicle inspections

Installing new tires

Installing air and cabin air filters

Installing wiper blades

Reseting and programming tire pressure monitoring sensors

Fluid exchanges

Batteries

For more advanced general service techs brake service would also apply

Understand The Work Board And Work Flow

Mechanical service Techs jobs will include but not limited to:

Brakes

Alignment

Check engine lights

Water Pumps

Timing belts

Tune ups

Oil changes

Fluid changes

Alternators

Batteries

Suspension, shocks, wheel bearings, struts act.

The General service techs are divided into teams. Typically two man teams to speed processes and speed waiting times for customers. Each team is assigned daily by the service manager. The service teams have their own hook on the work board; teams 1-4. The Mechanical service techs have their own hooks by name.

When the counter staff writes the order, they hang the work order on the distribution hook. The service manager reads the order and assigns the work order to the appropriate hook.

When the tech completes the his portion of the work order, he signs off on each item completed. If there is further work to be completed, he hangs the ticket back on the distribution hook for the service manager to assign and hook the remaining work to be completed.

When the tech is has completed and signed off the completed ticket is to be hung on the completed hook

If the inspection items that have been turned in and there is pending approval on needed work, the ticket is hung on the needs attention hook.

The finished vehicles are to be parked on the lower level. The waiting completed vehicles should be parked in the valet parking area. Pending air filter jobs should be parked next to the valet spot if available. The completed tickets on the completed hook with keys.

Team or tech works off their assigned hook

Team member reads over ticket to prepare to start service. Team member or service manager decides which bay to work to pull in, floor mat and pull in.

Understanding work flow and work board is vital to smooth operation and timely service of vehicles.

Getting Started On Your First Assignment

So you have been assigned your first ticket of the day either by your service manager or you have an open bay and alert your teammates or service manager that you are pulling a vehicle in the open bay. You go to your assigned hook and get the next ticket in order. The waiting red tickets should be first with the closest time on the ticket. The only time a black ticket should be skipped in front of the red tickets is when time gets close that is highlighted on the black ticket.

- Once you get your ticket read over for the written service
- Use a floor mat and seat cover and pull into bay
- If you are assigned to a teammate, share what service the vehicle is getting
- Proceed with service and digital inspection.

Digital Inspections

There are three types of inspections Complete Vehicle inspections and Courtesy inspections, wheel removal and courtesy without wheel removal.

- The digital tablet is pre programmed by the store manager and the service manger for each type of inspection.
- Select which inspection you are going to preform according to work order.
- Courtesy Inspections
Without tire removal
- Customer name and vehicle should already be loaded on tablet

Picture of vehicle

Picture of dash with engine running, check previous oil change sticker and rotation stickers for mileage to see if time to service if not written up for those items. If TPMS light is on, advise and scan sensors.

Mileage and tag

Check all lamps and bulbs

Check engine air filter, take picture

Check all items under hood:

Battery, engine oil, coolant, brake fluid, belts and hoses , any visible fluid leaks, wiper blades, and spray function

check cabin air filter - take picture

Under car, bearing and suspension check

exhaust condition, brakes as seen through the wheel

inspect tires, oe size current size, start air pressure, final pressure, tread depth,

Click button to submit, hang ticket on hook and proceed with work order service

Digital Inspections

- Courtesy inspection with wheel removal

Same as above, but after bearing and suspension check remove wheels and inspect and take picture the brakes.

- Complete Vehicle Inspection

Same as courtesy but add the following

Add picture of cabin and air filter

Picture of Battery test results

Lower the vehicle to check ball joints and follow check list of suspension parts

Measurements of brake pads required

Visual to check brake hoses, lines,

Raising a Vehicle

This portion of your learning process you will use daily in your tire and auto repair career.

There are five methods for lifting a vehicle.

Floor Jack

Floor Jacks with Jack Stands

Four post lift

Four post lift with swing arm jacks

Two Post Lift

Using a floor Jack

Let us imagine you are lifting a Chevy express van. Let's say you are repairing the passenger side front tire. You would read your ticket as you are sitting in the car. The passenger side is the right side, the driver side is the left side. The best lift point on the front of this truck in the lower control arm at the bottom of the shock is a good lift point. See Picture 1.

Let's say you are repairing the front brakes on this Chevy express van. You use two floor jacks at the front lower control arm and put a jack stand at the frame on both sides. Lower the jacks to let the weight of the truck rest on the frame. make sure your stands are heavy enough to support the load of the truck you are working on.

Let's say you are removing the two rear tires on the chevy van. Scotch the front wheels, put a jack under the rear end housing. If using stands, put on each side of frame at the rear. Picture 2.

Raising A Vehicle For Service



Picture 1.

The front lower control arm is where the shock absorber is bolted to the bottom that attaches the front wheel spindle assembly. Place the saddle of the floor jack at the shock and turn jack handle to the right and lift truck with floor jack.



Picture 2.

When removing rear tires, scotch front wheels and put jack saddle under round rear end housing. If you want a jack can be put under each rear shock absorber.

Raising A Vehicle For Service

When using a 4 post lift and not removing wheels center the vehicle and drive on 4 post lift. Make sure the vehicle weight does not exceed limits of the lift. Use controls to lift to desired height and lower to locks. See Picture 3.



Raising A Vehicle For Service

When using swing arm jacks on a 4 post lift, put lift pads under shocks as picture 1. for the front and under the rear shocks for use on rear.

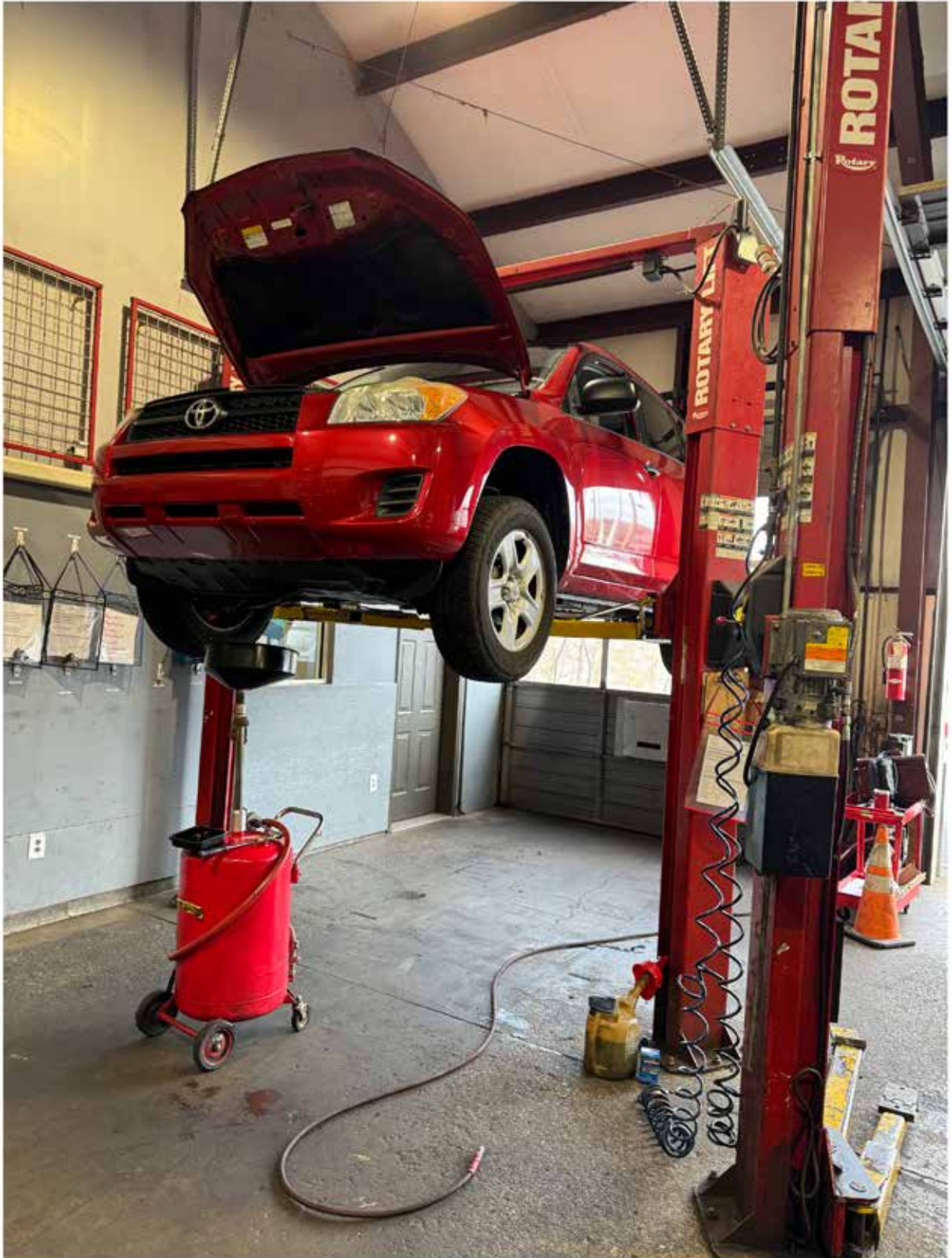
Raising A Vehicle For Service



Picture 4.

Two post lift

Raising A Vehicle For Service



Picture 5.

Two post lift

Raising A Vehicle For Service



Picture 6.
Floor Jack

Removing and Reinstalling Wheels

So you now have figured out which method you wanted to lift and raise the vehicle. Now if your work order calls for removal of wheels, we will now learn the process of wheel removal. Some vehicles still have hub caps that cover the lug nuts, which will make it necessary to remove the hub cap. Depending on the style of wheel cover, you may need a hub cap tool. Some hub caps are held on by plastic lug nut covers. Some hub caps will require a wire type or pocket screw driver to remove wheel cover.

Once you have the lug nuts exposed, you will need the proper size impact socket for removal, as there are many sizes of lug nut and socket sizes depending on the vehicle. Some of the fancy powder coated or fancy wheels will require a plastic coated socket to prevent scratching the wheels where the lug nuts are inserted. Time and experience will aid you in the different options of wheel covers, lug nut covers, lug nut sizes. The nut that holds the wheel on the vehicle is called the lug nut. The Part the nut screws on to is called the wheel stud.

Some wheels will have wheel locks that is a theft deterrent. You will need the customer's wheel lock to remove the wheels. You will usually find the lock in the customer's trunk by the spare or in the glove compartment. Be sure to return the lock where you find it. Sometimes it will be necessary to remove the wheel lock and replace with standard lug nuts.

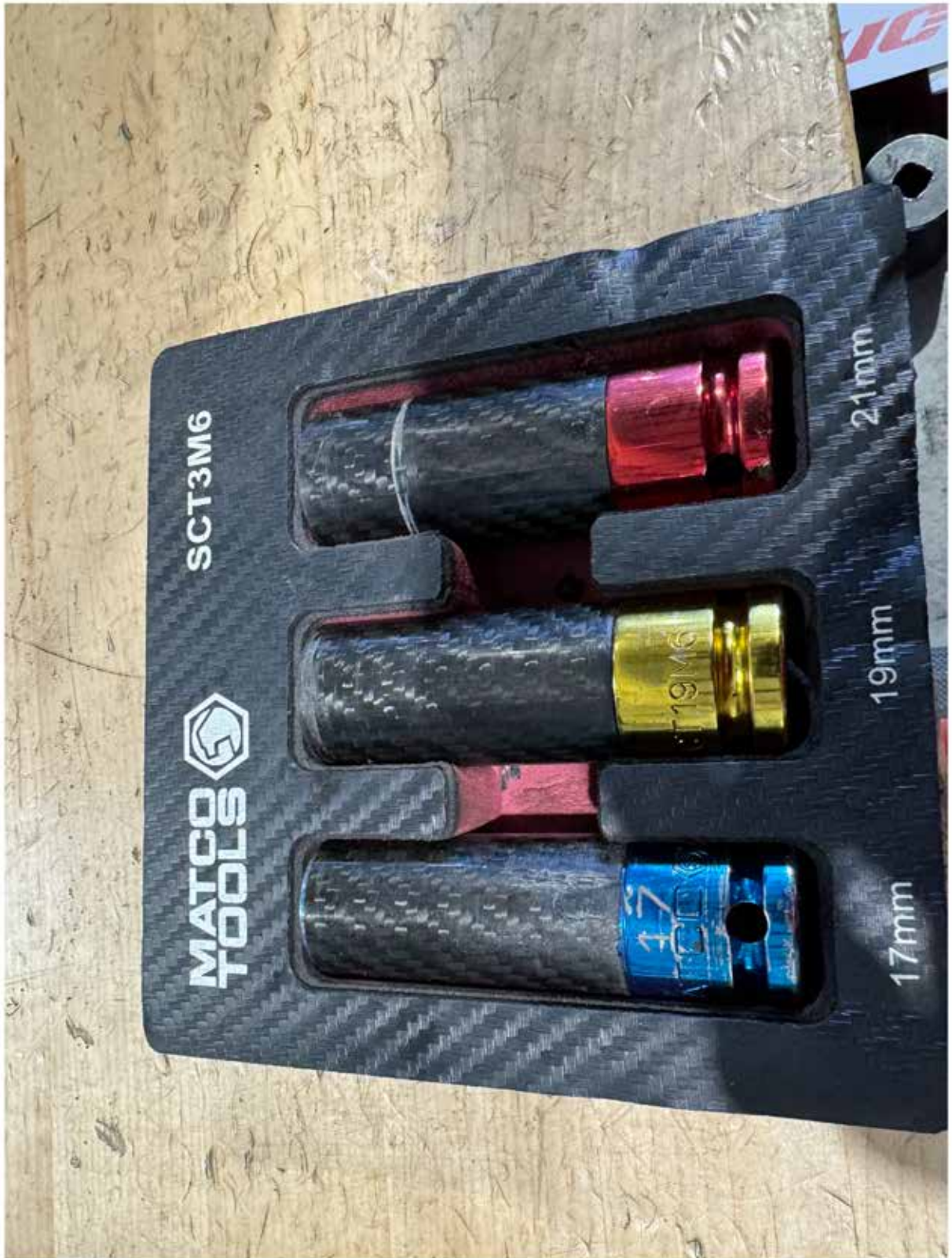
There is a kit that will aid you in this process. Sometimes the factory lug nuts will swell making the socket very difficult to fit. This will slow your process and possibly require you to recommend replacement with a better one piece lug nut. Sometimes you will find the wheel stud has been crossed threaded and will have to be broken off at the hub and be replaced. if you find this is the case let your service manager know asap so he can order the correct replacement and assign this job to an experienced tech for repair.

Removing And Reinstalling Wheels



Picture 7.
Hubcap Tools to remove wheel cover

Removing And Reinstalling Wheels



Picture 8.
Coated sockets to prevent wheel damage

Removing And Reinstalling Wheels



Picture 9.

Most common flip socket. 19mm on one side and flip over to 21mm.

Removing And Reinstalling Wheels



Picture 10.
Wheel lock removal set (cheater set)

Removing And Reinstalling Wheels

Now you have the lug nuts exposed and have the correct socket to remove the lugs, now it is time to choose your gun for removal of the lug nuts. There are pneumatic air guns (impact wrench) which is the most common tool in shops. There are 1/2" drive, 3/4" drive and 1" drive pneumatic air guns. The most common is the 1/2" drive. Pneumatic is air operated that has to be hooked to an air hose that is provided air by the shops air compressors. The 3/4" and 1" are used on the larger trucks such as NPR Hino, and large dump trucks. There are also battery operated impact wrench, as well as a hand tool called a four way that is a manual lug nut removal tool.



Picture 11.
PNEUMATIC 1/2" IMPACT WRENCH WITH FLIP SOCKET AND AIR LINE ATTACHED

Removing And Reinstalling Wheels

PICTURE 12.

1/2" Battery powered impact wrench



Battery powered tools are becoming more popular in shops today. However pneumatic is the standard. We will cover wheel tightening later, but in case a battery gets weak and may not tighten a lug nut tight enough, pneumatic is still the best bet. I will tell you about a much safer back up method to prevent wheel off's in the section of lug nut tightening.

Removing And Reinstalling Wheels



Picture 13.
3/4" pneumatic impact wrench for larger trucks

Removing And Reinstalling Wheels



Picture 14.
1" pneumatic impact for large trucks

Removing And Reinstalling Wheels

Most of the lug nuts we remove today are right hand thread. Some of the Hino and NPR trucks are left hand tread on the left side. They will be marked with a L for left and R for right. The Chrysler products from the 60's had left hand nuts on the left side, but the mainstream we deal with today are right hand threads. That means to remove them they should turn counter clock wise. The old saying righty tighty lefty lucy.

So you have chosen the correct socket and a pneumatic 1/2" drive impact wrench to remove the lug nuts on your job. The dial on the side will increase or decrease the air power from your tool. The trigger you engage with your finger. The button that slides through the wrench will determine which way the anvil will turn, if you pull the button on the bottom side front back, it will turn the anvil to remove right hand lug nuts. If you push the button toward front of the gun, it will tighten the lug nuts. Always hold your socket and make sure it is going the correct direction.

Let's say you are installing 4 tires. Once the lugs are exposed, start with the driver front (LF), LR, RR, RF. remove all lugs, remove wheels. Now that the new tires have been installed we will now learn how to reinstall the lug nuts and the wheels.

Always start with the driver front. If you forget to tighten a wheel, the driver front is the most dangerous wheel to come off. A wheel off is the unforgivable sin in the tire business. Getting the wheels properly tightened and torqued is the most important part of our business. Our Customers lives are in your hands at this moment. You should think of this with every wheel you tighten.

Hang all of your wheels and start your lug nuts with your fingers. Make sure there are no worn studs or nuts at this time. If they start on the wheel stud nice and smooth, you will feel that they are good. Once you have all 4 wheels with the lug nuts properly started, it is time to start the process of lug nut tightening. ALWAYS START WITH THE DRIVERS FRONT! You will need to add a tool to your impact wrench and socket. This tool is called a torque stick. The torque stick comes in different torque capabilities. Some vehicles call for very low torque. 65-72 foot pounds of torque. For simplicity and fear of not getting a truck tight enough, we use 90 ft lbs torque sticks on everything. It will not allow the impact to tighten over 90 foot lbs. Once we tighten the left front we move to the left rear, right rear and last right front. Once they are torqued by one person, the vehicle is lowered to the ground where the wheels just kiss the floor and a torque wrench is set to the specs for the vehicle and the wheels are final torqued until the clicker on the torque wrench is engaged. Both teammates must sign off on the ticket the lugs were properly torqued. This double torque stick and torque wrench and follow up by the teammate will eliminate the possibility of a wheel off. When tightening a star pattern is to be used to prevent wheel cocking and causing a wheel to get loose. Careful examination of the back not the wheel and hub assembly to make sure there is no debris that could

Removing And Reinstalling Wheels

cause a wheel to become loose. A star pattern is where you run the lugs up slightly one across from the other and then tighten them in the star pattern. This will reduce the risk of cocking a wheel and warping a brake rotor.



Picture 15:
90 foot pound torque stick

Removing And Reinstalling Wheels

Picture 16.

Torque Wrench



Your Tire Shop point of sale software should give you the torque setting for the vehicle you are working on. Set the torque wrench to the proper setting. Torque your wheels in a star pattern.

Tire Rotations

At Bass Tire, part of our back up service is free rotations with tire purchase. So in the tire business tire rotations many times will coincide with oil changes. On a standard 4 wheel vehicle, there is three ways that tires can be rotated. The industry standard is straight from to rear and rear to front. There is also the x rotate, where you move the LR to the RF RF to LR, RR to LF and LF to to RR. There is the modified x where you cross the two rear to the front and move the front to the rear.

We have already learned how to:

1. Read work order
2. Raise vehicle
3. Remove lug covers or hub caps
4. Choose impact wrench and socket
5. The next steps we will now learn are: on rotations is to;

Scan TPMS to make sure sensors are ok. If the light is not on when you pull the vehicle in, you can skip this step for now.

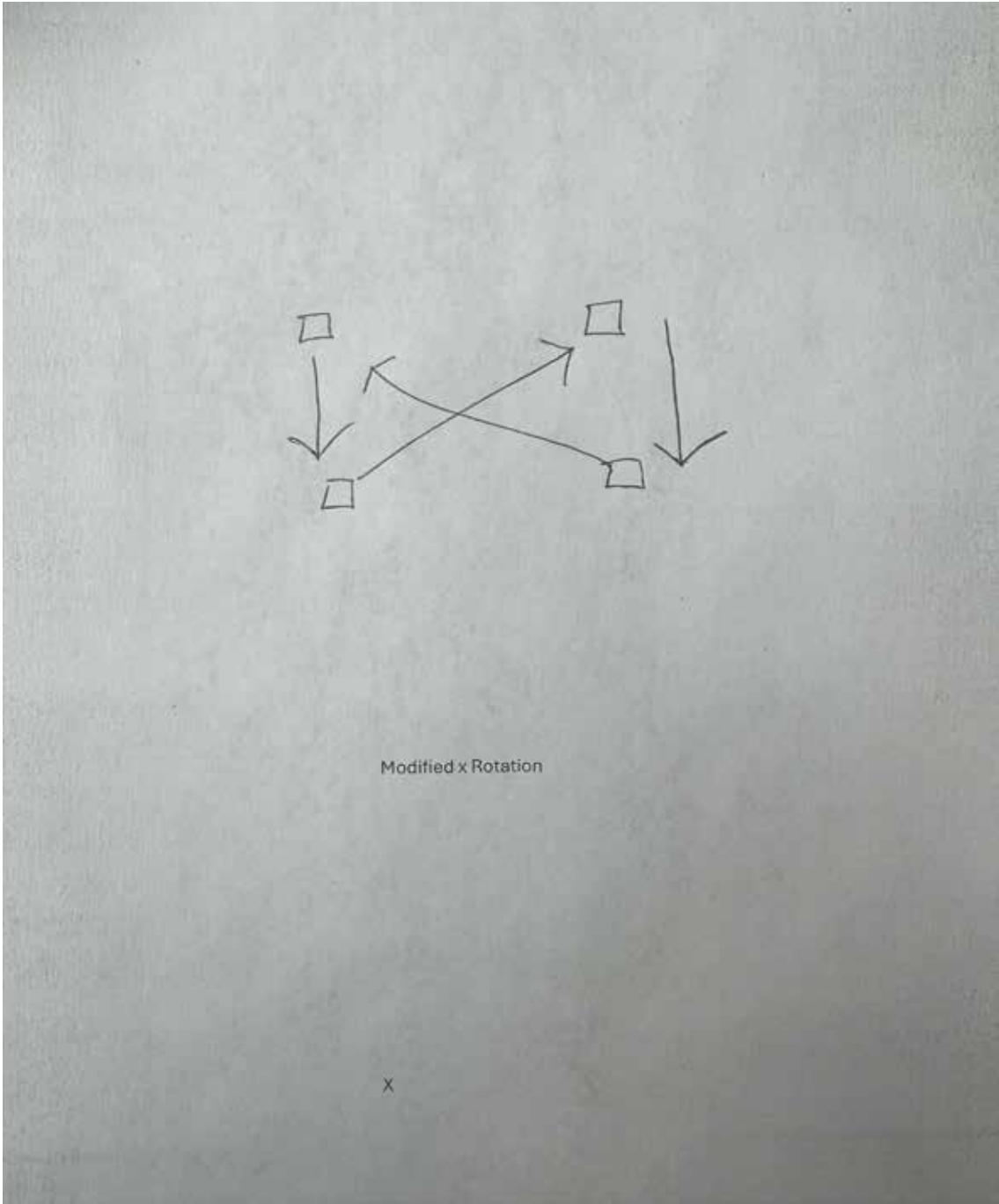
6. The next step is to set the air pressure to the recommended pressure on the door jamb.

If you find one tire is 5-10 lbs lower in pressure than the rest, you will probably have a low tire light on, and that tire should be inspected for a leak.

7. If no excessive low tires are found, proceed with inflation, and rotation by the standard pattern unless the work order calls for a different type of rotation pattern.

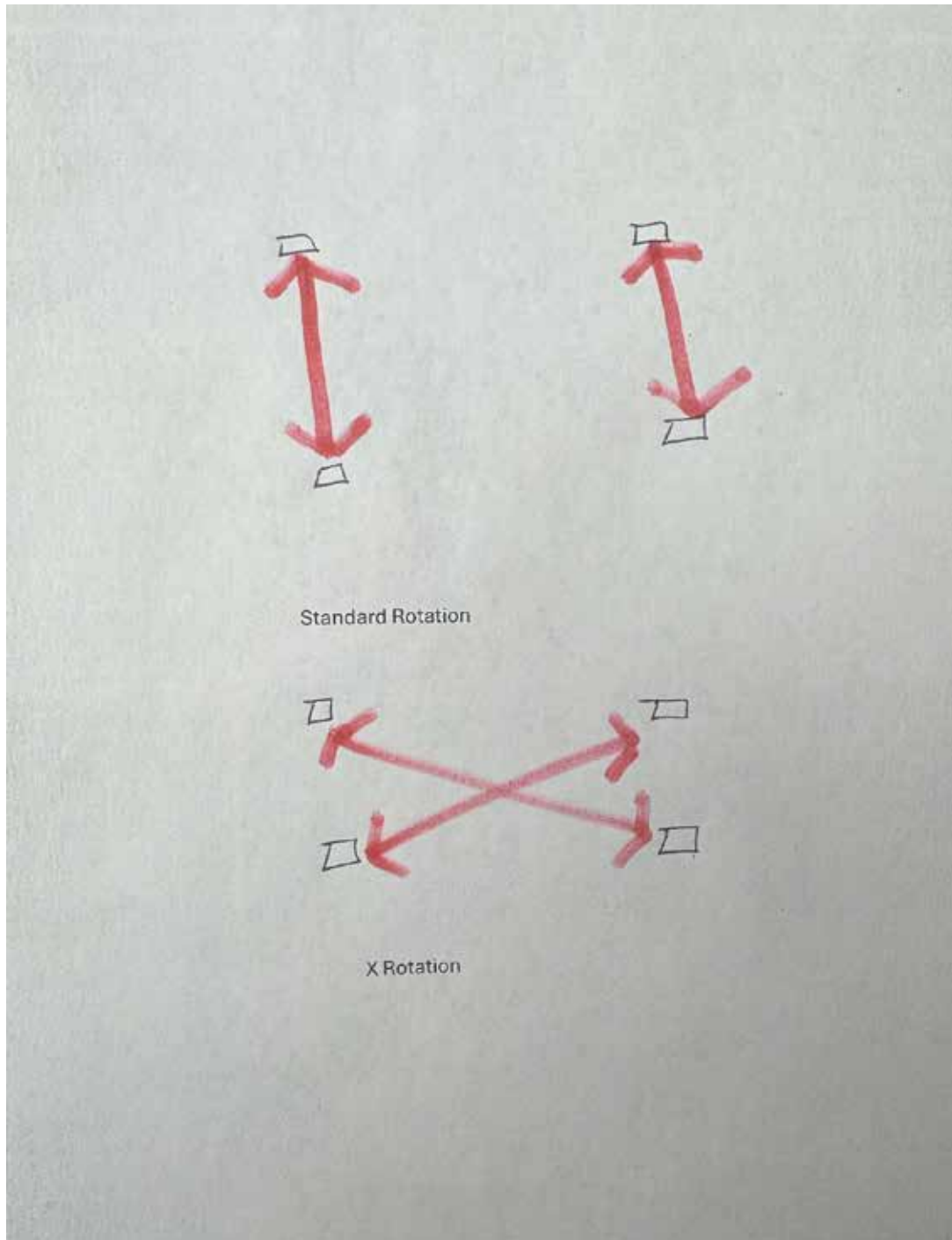
Use the wheel reinstall directions you have already learned

Tire Rotaions



Tire Rotations

- Once the rotation is complete, reset or relearn TPMS
- Put a tire rotation sticker on windshield for 5k
- Sign off on ticket if no other service is to be performed
- Park car and hang ticket on completed board



Tire Rotations

Rotation on 6 wheel dual trucks will be much different than passenger and light pick up trucks. On Dually trucks, hopefully the service writer has inspected the tires to give you a head start on instructions. I will list the items you will need to know when rotating a dually.

1. Determine if you have steel wheels or aluminum wheels
 2. Determine if rear tire tread pattern is more aggressive than the front tire tread pattern
 3. If steel wheels and truck has simulator wheel covers how you get them off can be tricky
 4. If has valve extensions on rear
 5. How to check air in rear wheels if you are not removing rear wheels
 6. If the truck has TPMS and how to reset
 7. Make sure air is set to factory door jamb specs
- On a dually wheel the rear inside fits on truck just like the front wheels
 - the outside rear wheel fits backward from the front. It has to be turned backwards to mount on truck.

When mounting the rear wheels there are a couple of items you must remember.

1. Make sure there are no hub dowel pins that aligns the wheels. Some of the older trucks had these and if you did not align with the dowels hole in the wheel, it would not allow the dual assembly to properly seat and tighten.
 2. There are slots in the rear wheels which will allow you to check the air in the rear inside tire without removing the wheel. If you don't put the valve stems 180 degrees apart it will block the inside rear wheel slots.
- If the truck has alloy wheels, the rear inside will most likely be a steel wheel, as it is not a good practice to put two alloy wheels together.
 - If the truck has alloy wheels, the rear outside wheels will most likely have a polished finish and the outside of the front wheels will have a polished finish, so a rotation will necessitate dismounting tires from the wheels remounting and rebalancing.
 - Checking the air on the rear duals while still mounted on truck will require a dual foot air gauge and dual foot air chuck.

Motor homes and larger trucks do require a more experienced skill set when dealing with dual rear wheels. It is some harder and will take longer.

Tire Rotations

The spare tire is often ignored during rotations. One reason is the degree of difficulty accessing the stem to inflate. If the spare is not checked and the customer has a flat while traveling and the spare is flat it does not do them much good. A good practice is to check spare at least twice a year. Bass Tire is working on a maintenance schedule to give our customers at check in, we will be adding that to our semi-annual inspections. In the mean time, if the spare is pretty easy accessed it is a good idea to check.

TPMS

What is TPMS? Tire Pressure Monitoring System. Each passenger car and light truck that is sold in the US is equipped with TPMS. It started after the Ford Explorer and Firestone recall in the early 2000's. The TPMS is to alert the driver if the tire pressure is below the safe operating threshold. If the TPMS light comes on, it alerts the driver of a problem. If it flashes, it indicated a severe issue or a faulty TPMS sensor. My opinion is that the TPMS is a great safety feature on a vehicle and I want mine in perfect working order. The cost of replacing the sensors when they fail seems to keep some drivers from having them replaced, but I highly recommend having them working properly. Dealing with the TPMS has added more service time, training, equipment, and customer education for the auto service and tire dealers. There is not one size that fits all. The principle is the same, but different vehicle manufactures have different types of TPMS and different reset and relearn procedures.

MAX SENSOR

WHAT IS TPMS?
Tire Pressure Monitor Systems (TPMS) warns drivers when air pressures in your tires are significantly under-inflated.

EXTENDED TIRE LIFE
Under-inflated tires reduce the overall life of the tire by wearing down tire tread faster.

REDUCE ACCIDENTS
TPMS reduces the likelihood of severely under-inflated tires by 55% drastically reducing accidents and injuries.

FUEL EFFICIENCY
Increase your gas mileage by up to 3.3% with properly inflated tires.

HOW DOES IT WORK?
TPMS sensors report real-time tire pressure information to the driver of the vehicle, typically through a low-pressure warning light.

TPMS SYSTEM DASHBOARD ICONS

- TPMS ICON LOW PRESSURE
- TPMS ICON SYSTEM FAILURE

MAX-SENSOR.COM

The card features two TPMS sensors, one silver and one black, mounted on purple plastic bases. A diagram at the bottom shows a car with a 'DASHBOARD DISPLAY' and a 'RECEIVER' on the roof, with arrows indicating the sensor's signal path. The background is white with purple accents and a large, faint 'MAX' watermark.

There are two types of TPMS, indirect and direct systems. The indirect works with the Antilock brake systems and do not have sensors at the valve stems in the wheels., The direct works from a battery powered sensor attached to the valve stem.

If the TPMS is a rubber valve stem mount, the valve should be changed with the new tire. If the TPMS is an aluminum one piece TPMS, it will not have to be changed until it malfunctions or the treaded part were to become broken. • When airing up an aluminum TPMS assembly, special care needs to be taken to not break the sensor.

- When mounting a tire special care needs to be taken not to break the TPMS.

Many vehicles will require A relearn of the TPMS after a rotation to learn the sensors to their new position. If not it may alert the driver of a low tire and it may not be the correct position on the vehicle of the low tire. Relearn procedures are different for different vehicles. Tire shop point of sale software will usually give the reset and relearn procedure. Many of the scan tools used to test and relearn the TPMS will also give the steps of resetting the TPMS. Some vehicles will display the position and air pressure. • It is a good practice to scan all sensors if the low tire light is on.

- Some vehicles will have to be put in the learn mode to relearn the TPMS.

TPMS



Autel scan tool may be needed for more difficult TPMS systems: Nissan, Honda, Dodge, Toyota

- Make sure to use a plastic valve cap on an aluminum stem as electrolysis may form and not allow metal cap to be removed.

TPMS

- Each manufacturer reset procedure is a little different. The scan tool which you will be taught will give you good prompts and instructions. Tire Shop software is also capable of giving you tips on reset.



TPMS

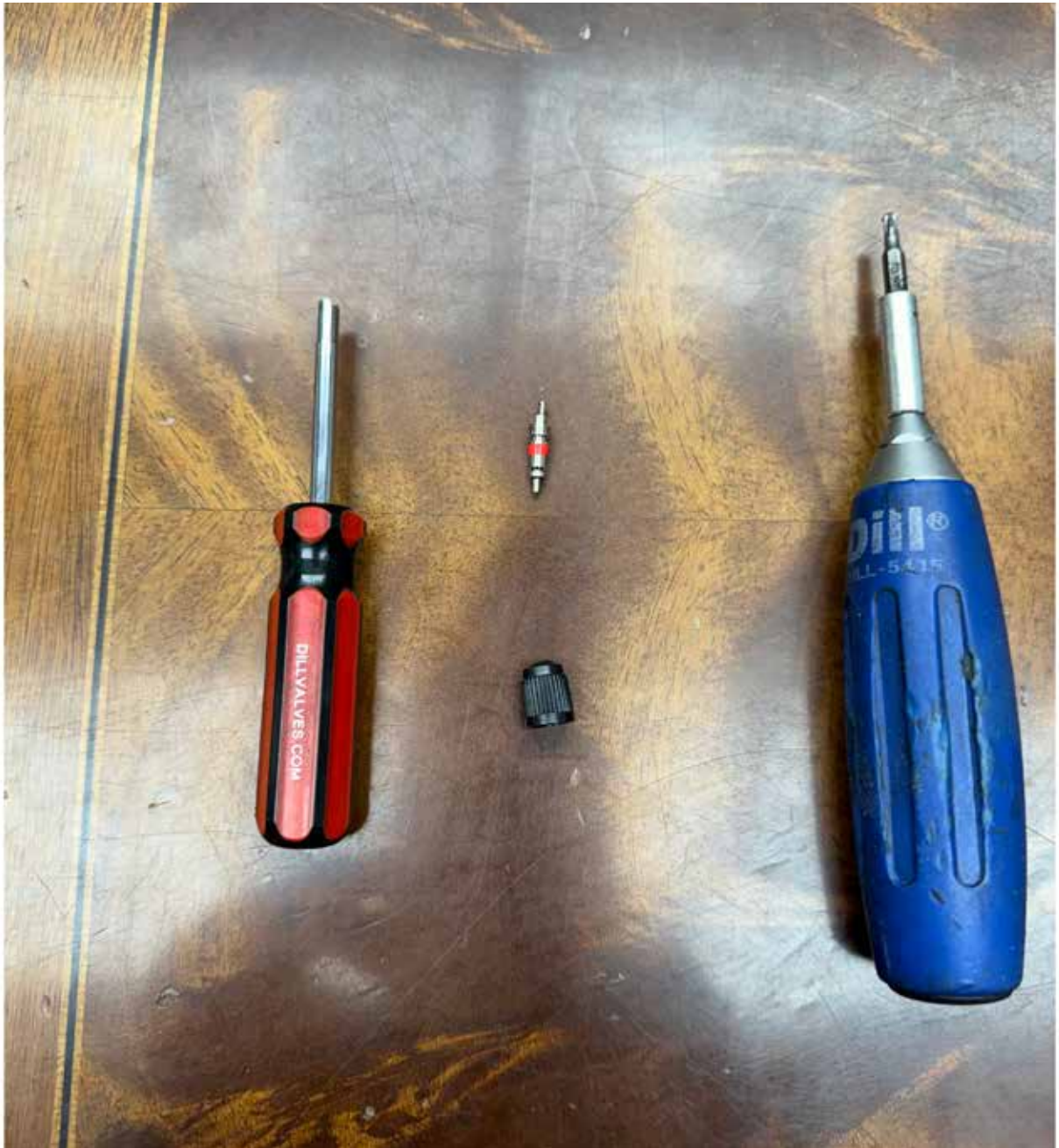
Standard TPMS tools

When installing a new sensor the type of vehicle will need to be programmed to the sensor. Sometimes the sensor ID numbers will have to be downloaded to the vehicle. When the TPMS is not reading when scanned, you will need to recommend replacement. You will need to see the other sensors to determine whether to use rubber stem or aluminum. My experience is that the average battery life of a TPMS sensor is 5-10-years. The batteries themselves can not be changed.



Dismounting and mounting tires

Now you have learned the work board, how to raise a vehicle, learned how to remove the wheels let us learn about dismounting and mounting tires. There is some tire shop tools and lingo you will need to learn.



Valve core removal tool

Top, valve core
Bottom, valve dust cap

TPMS screw tool

Mounting And Dismounting Tires



Valve stem puller and installer

valve stem, and TPMS replacement stem

Mounting And Dismounting Tires



Wheel weight pliers

Scraper to remove stick on weights

Mounting And Dismounting Tires

Let's say you are going to install four new tires.

- The first thing you and your teammate will do is to read work order carefully. Verify your four tires are here before bringing vehicle in shop. Pull the tires and record the department of transportation (DOT) numbers on the work order. This is done so the service writer can record them on the customer invoice. They will be registered through a third party to be DOT compliant in case of a safety recall. (THERE IS A FINE POSSIBLE FOR NOT REGISTERING TIRES).

You have raised the car, removed the wheels, the next steps are as follows:

- Remove the valve cores to let the air out of the tires
- Remove all of the old wheel balance weights from the wheels
- Stack all four in a nice neat stack to get ready to dismount
- Have new tires near the stack of wheels to be changed
- Choose the machine best suited for the type of wheel you are working with



Mounting And Dismounting Tires

Standard rim clamp machines will generally have the bead break down arms to the side. Start with the front side first to be careful and not damage the TPMS sensor.

- Using the proper foot pedal,(if applicable), apply pressure to allow the breakdown arm to break the bead from the wheel. (Note, be careful to not catch the wheel causing damage). Once the front side is broken down, turn the wheel around and repeat the process to break down the rear. Some machines you will use the handle to operate that function of the tire changing equipment.
- Once you have broken down the tire bead from the rim flange on both sides of the wheel, it is time to place wheel on tire machine turntable for dismounting. It is generally better to open the clamps and clamp the wheel from the outside of the rim flange. The machine is capable of clamping the inside of the wheel which is easier, however the jaws of the clamp on the machine will leave a mark on the wheels.
- Once you have the wheel clamped and ready to dismount, lube the bead of the tire with bead lubricant.
- Move the dismounting arm of the tire changing machine and roll knob to move mounting head slightly away from wheel.
- Insert tire changing bar with the curved side down and insert between the duck head of the dismounting arm and push forward to get bead of tire above duck head. Press the pedal of the tire changing machine to operate the turntable to start the dismounting process of removing bead of old tire from the rim.
- Repeat the process on bottom bead.
- Now you have a naked wheel and ready to mount the new tire. LUBE THE BEADS, AND press the bottom bead down with the mounting duck head while pressing the turntable pedal which will turn forcing the bead onto the rim flange. Repeat process with two bead.
- Now the tire is mounted, use the inflator to inflate the tire. Sometimes the bead blaster function of the machine will have to be deployed. Once the air is started and the bead becomes seated, release the wheel from the clamps using the foot pedal. The tire changing machine will have an air gauge. Compressed air is very dangerous. On a passenger tire it is not a good practice to inflate over 50psi to seat beads. Most passenger tire have an air pressure of 35psi. But be sure to check door jamb for the correct pressure. Double check the accuracy of the machine gauge with a hand held air gauge.

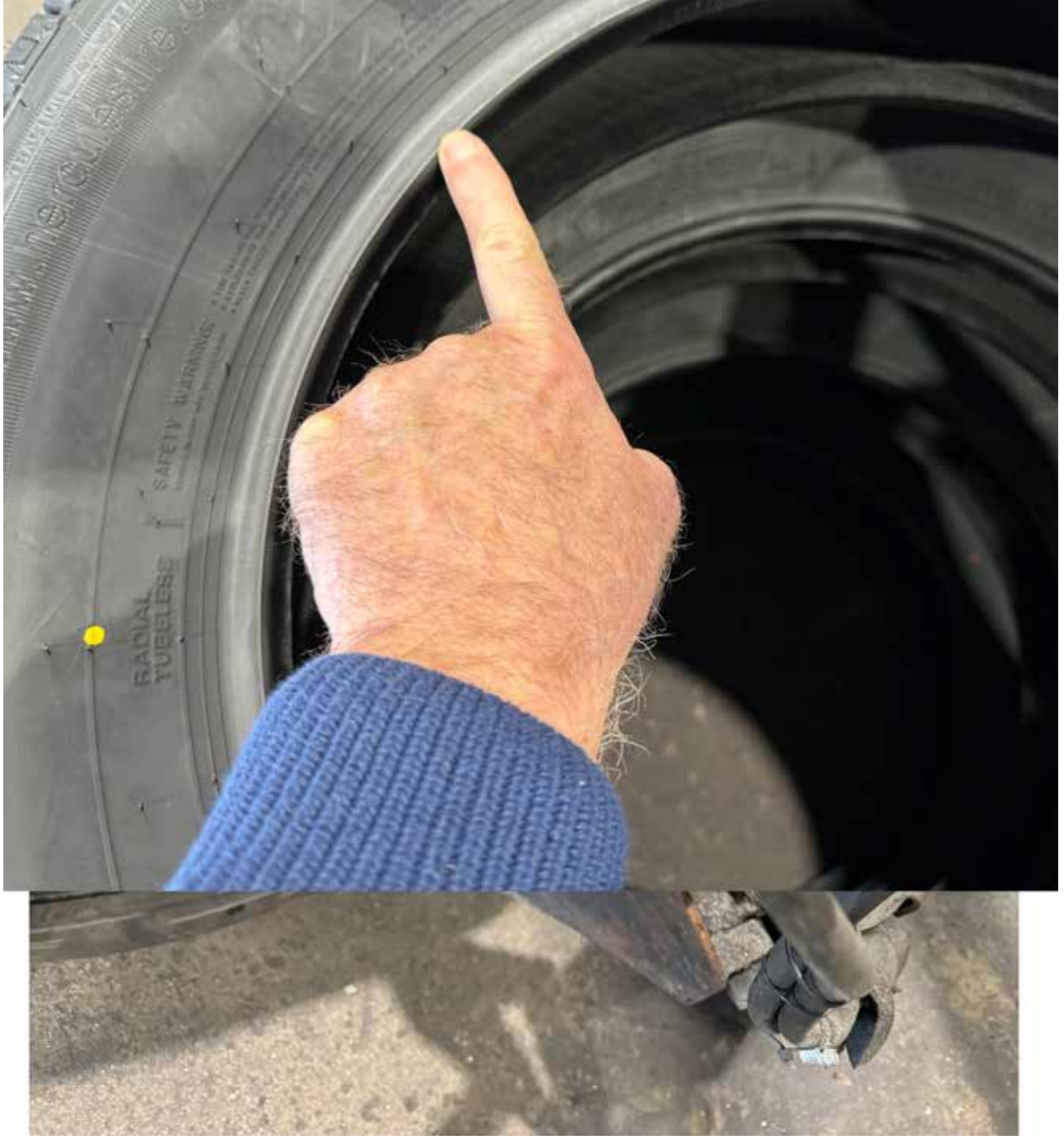
Mounting And Dismounting Tires



Picture of breaking the front bead from the rim flange

Breaking back bead

Mounting And Dismounting Tires



Bead of tire

Mounting And Dismounting Tires



Rim clamped from outside of rim flange

Mounting And Dismounting Tires



Picture shows rim flange

It is important on an aluminum wheel that all rim flange oxidation be removed by a pneumatic hand buffing wheel. (Always use eye protection when buffing a tire or wheel).

Repeat the process until you mount all four tires. The next step is to balance the wheels, reinstall which you have already learned, torque the lugs and finish the car with the steps already learned.

Wheel Balancing

Imagine the scales of justice picture. If the weight is even on both sides of the scale, the scale will be balanced. If the scale is dropped on one side, that side is too heavy and not in balance. In order for a vehicle to ride nice and smooth the wheels must be in balance. There are different methods and machines available to balance tires and wheels. Now days computer balancers are used mainstream for passenger and light truck tires. Days gone by had bubble or static balancers, on the car tune in balancers, strobe light balancers. As technology has improved, the simplicity of wheel balancing has improved. The two methods we will learn about will be computer and balance bead method.

Balance beads are used on heavier and larger truck tires. Depending on the size of trucks tire you are balancing, that will determine the weight of balance beads you will install in the truck tire during the mounting process. You will be trained on this process of mounting and balancing medium and larger truck tires during your internship at the tire store.

- When setting up your wheel balance machine you must decide the mounting cones and set up for the particular wheel your are working with. The size and type of wheel will require different cones and adapters to properly mount wheel assembly on the wheel balancer. Balance set ups are like the TPMS, it is different for many of the different wheels we work on.
- Once you have your wheels properly seated on the machine, You must decide the position on the wheel you will attach the weights, program your machine and lower the protective hood on the machine. Most of the machines will self calibrate the rim diameter, and the rim width. If your machine does not auto program, you will have to manually input the information. Once you have lowered the hood the machine will start it's spin cycle to balance the wheel. Make sure the wheel assembly is running true and not too much up and down or side to side motion. If you find it is, you may have to stop and recheck your set up.
- Once your spin cycle is complete, the machine will come to a stop. The screen will give you the weights increments in ounces or grams, depending on the type of weight you are using. For a standard 2 plane balance, it will give you the outside plane reading and the inside plane reading, or you may choose a static which we will learn during your shop training. Let us say we are working with a standard steel wheel. It will require standard weights on the outside and inside lip of the rim. Start with the inside measurement and roll the tire and wheel in the direction of the arrow, to the top dead center when the arrow is in the green. That is where your weight goes. Use the weight hammer to install weight. Repeat the process on the outside plane.

Wheel Balancing

Once you have installed the weights, lower the hood and let the machine spin to make sure your wheel is balanced, if it is it will come up zero. The type of wheel you are balancing will determine the type of weight you will use. For instance on a black custom alloy wheel, you will generally use a black stick weight. All which you will learn in shop training.



Small cone for back side mounting

Wheel Balancing



Screen of balancer showing zero after spin. Note the yellow drive on weight on backside of wheel and the yellow stick on style on the inside of the front wide of wheel.

Wheel Balancing



Different adaptors for wheel set up

Wheel Balancing



Different styles of wheel weights depending on the wheel you are working with.

Now you have all of your new tires balanced, reinstall with the process you have already learned. Reset your TPMS, signs off and follow the process you have already learned.

Flat Repair

Now your customer has had a low tire light come on or had to put their spare on, or had to air up a tire. Keep in mind that your customer has had their day interrupted by this unfortunate occurrence. Be kind to them as their day may not have started out the best. Let's say the low tire light is on in their 2019 Chevy Silverado. The display shows the driver rear low. That is the information they have given the counter staff. So the service writer writes it up for a LR FLAT.

Key factors to remember

- The TPMS may not have been relearned to their new position during the last rotation. So the driver rear may not even be the tire that is low. Double check air pressure in all four tires with gauge or TPMS tool before jacking up vehicle. Sometimes the customer has added air to the low tire and it may be necessary to have a conversation with the service writer or the customer as to which tire we are working on.
- We as technicians have always been taught the tire positions as we were sitting in the vehicle. Passenger side is the right side as we are sitting in vehicle and the driver side is the left side. Customers may not have been taught that way and the wrong position may have inadvertently told the counter staff the wrong tire.
- Most causes of leaking tires

Leaking around the rim (alloy oxidation)

Nail or screw

Broken wheel

Bent wheel

Sidewall puncture

Impact break sidewall

Valve stem

Valve core

- Bent wheels that cause tire to leak between bead and tire will require straightening procedure or replacement
- Cracked wheel will require replacement
- Sidewall puncture and impact break will require replacement
- leaking valve stem will require stem replacement
- leaking valve core will require tightening or replacement
- A nail, screw or puncture too close to shoulder of tire will require tire replacement

Flat Repair

A puncture in the safe zone will require a patch to repair. A plug patch combo is a good choice many times, which will fill the hole and prevent moisture from getting to the steel belt. Plugs should only be used on mower and off road applications, as the liner is very thin on those tires. Plugging should never be a longterm proper method of repair. If the tire has been run flat or low of air, there could be damage inside the tire causing an unsafe condition. The tire should always be dismounted and inspected.

Follow the steps you have already learned:

raise the vehicle

remove the wheel

Find the source of the leak by inflating the tire, putting the tire and wheel in the dip tank to search for bubbles, if you can not see the leak spray with a soap sud mixture. Once you have found the leak;

- Be sure to use tire chalk to mark the valve stem and weight so when the tire has been repaired the tire can be mounted back in the same position and the weight returned to not change the wheel balance.
- Dismount the tire from the wheel using the dismount process you have learned.
- Use a reamer drill bit to make a nice clean hole for repair
- Buff inside tire where you are going to apply patch, use rubber pre buff cleaner before and after buffing.
- Apply glue and allow to dry
- Apply patch and use stitcher to the patch, remove plastic from patch material
- Mount tire and inflate and double check repair for leaks, follow reinstall process you have already learned. Be sure to set air and TPMS on all tires.

Changing Oil

- Follow steps you have learned about raising vehicle and reading work order. The ticket should give you valuable information such as filter number, type of oil, and number of quarts required.

Follow inspection process,

- Use the drain pan assembly to catch old oil.
- Remove the oil plug and start the drain process. •
- Remove the filter.
- Reinstall the filter, generally hand tight.
- Reinstall oil plug and torque to specs.
- Lower the vehicle and use a funnel to pour oil in vehicle.
- Start the vehicle, raise to check for leaks
- Using a spray cleaner clean any oil residue from under carriage to prevent smell and oil getting on customers driveway or garage floor. This is an important step!
- Once you are satisfied the oil level is correct by the dip stick, clean any greasy finger prints from car
- Reset the oil maintenance life indicator
- Put an oil change reminder sticker for 5k
- Follow completion steps you have learned

Batteries

During the inspection process, checking batteries for volts, terminals condition (broken, loose, or corroded), charging system test, date on the old battery is all part of the inspection process. Sometimes you will get a work order that reads check battery and charge system.

There are multiple tools to check batteries and charge systems. A simple meter that you put the cable on positive and negative battery terminals and read the voltage, then start the vehicle and read the volts on the charging system is pretty straight forward which you will learn in your shop time.

Just a few short years ago, batteries would last 5-7 years. Now days batteries cost twice as much and last half the time. There are two places on a battery to see how old a battery is. The top has a date punch out that if it has been properly punched, it will give you the date of install. there is a date code sticker on moist batteries on the side of the battery. It may read C23, that means the manufacturer date is March of 2023.

- If a customer is having an issue with a battery and had to boost and the battery is three years old, I would suggest to replace.
- If the meter reads weak or replace when the red load button is depressed, I would suggest to replace.
- If the alternator is bad the battery must be charged or replaced due to a weak battery can make the new alternator fail
- If a vehicle will not start but the battery test good, see if the lights stays bright when the key is engaged, also see if the horn will blow when the key is engaged, that will indicate a starter, ignition, key or security problem, not the battery.
- Most batteries are shipped with the battery acid in the battery. The acid is very corrosive and eye protection should be worn when dealing with batteries. If you are transporting a battery and the acid gets on your pants, It will eat a hole in the fabric. If it gets on your skin, it will cause a burn or irritation. If it gets in your eyes, flush immediately with water and eye wash.
- The batteries with acid are called flooded and the water needs to be checked periodically in the battery.
- The AGM Absorbed Glass Mat or gel batteries do not contain water and acid and are commonly used in motorcycles, atvs in case of a roll over.
- Always use safety glasses when cleaning the battery terminals as the corrosion is a by product of the acid.

There are many different battery fitments. Like wheels and TPMS there is not one size fits all. Also, some battery replacements are fairly easy while others are very complicated.

- Always disconnect negative terminal first when removing a battery.

Batteries

- Always connect positive first when installing a new battery. This will keep from causing a spark or surge that could damage a fuse or the vehicles computer.
- Some batteries are in the trunk or under the back seat or in floor panel. This will require a vent tube to remove battery gasses from the passenger compartment.

We will learn in shop time about terminals and battery installation.



Wiper blades

Wiper blades are overlooked until it is raining. Most vehicles today have a wiper on the rear window. If a wiper blade is dry cracked, splitting away from the arm or not cleaning very well, it should be replaced. Most wiper blade assemblies come with an alcohol packet to clean the new blade. It is a good practice during the inspection process to test the windshield washer to see if it is working as well as how well the wipers clean the windshield. Make sure the proper size and fitment is used, because an improper wiper can come off during use and either scratch the windshield or impair vision and cause an accident. As you can see, wipers are very important.

- Windshield washer fluid has to be winter approved to not freeze during winter.

Importance Of Air Filters And Cabin Air Filters

- In a combustion engine, air is mixed with fuel. A dirty air filter results in dirty air mixed with the fuel, which effects performance and the engine
- A dirty cabin air filter effects the performance of your heating and air conditioning system, and the air you breath in the cabin area of your car. Care must be taken to properly install both to avoid damage to the breather box or the glove compartment.
- When replacing a cabin air be sure to wipe of greasy smudges from the glove box

Essential Fluids

- Fuel: On combustion engines you will need gasoline or diesel to operate the vehicle. The gas tank cover should tell you the type and grade of fuel required by the vehicle

Engine oil: The oil cap on the engine may tell you what type of engine oil to use. The vehicle's owners manual may tell you as well. The shop point of sale software should tell you also. There are many weights and types of engine oil. There are conventional oils that may require changing every 3k miles. Synthetic oils can go up to 10K mi, however that is a long time to go without checking the oil level; so for that reason I suggest every 5k. Without there proper oil level, type of oil and regular exchanges, there can be significant engine wear and damage. My father always used to say, if you run out of gas it will hurt your feelings. If you run out of oil it will hurt your wallet and cost you an engine. Most vehicles have an engine oil dipstick with full level markings and low level markings and should be checked periodically between oil changes. Some of todays newer vehicle do not have a dipstick and the level is checked through the cars onboard dash controls.

Explaining Motor Oil Viscosity Grades

Viscosity is the resistance to flow of a fluid. The American Petroleum Institute (API), developed a scale that represents start up temperatures and higher operating temperatures. The low temperature viscosity of the oil is a measurement that simulates starting a car on a cold winter day. The value has the letter W after the number and has a dash after the letter w. For example: If the oil is a 5W-40 the 5W describes the viscosity of the oil on start up. The lower the number the faster the oil will flow at start up. The 40 defines the viscosity of the oil after the engine has warmed up. The lower the number the faster the oil moves around the engine.



Essential Fluids In Vehicles

Transmission Fluid:

Like the engine oil, most vehicles have a transmission dip stick to allow you to check the fluid level. Some modern vehicles do not have a dipstick which indicates the transmission could be sealed from the factory and do not require fluid exchanges. That said, some vehicles still require transmission fluid exchanges which requires special tools and adaptors to check and fill the fluid. Many times this will cause the customer to consult the services of a dedicated transmission garage or the dealer specific to the vehicle. The vehicle service manual or your shop POS software should give you the intervals for transmission fluid exchanges. The average mileage interval is 40K miles. Transmission fluid is like engine oil, there are specific types for different vehicles. Like engine oil, the transmission fluid is designed to provide lubricant for the automatic transmission to transfer engine power to the drive train with out the use of a manual clutch and shift lever.



Power steering fluid:

Vehicles that have hydraulic steering will require specific fluid for that application. The vehicle service manual or your shop point of sale software will give you the type and interval it should be serviced, which is normally 30K. The power steering fluid will go into the power steering pump reservoir. It will normally have a dip stick or full markings on the reservoir. Some vehicles have electric power steering and in most cases do not require fluid or exchanges.



Essential Fluids In Vehicles

Differential Fluid:

Some vehicles will have front or rear differential fluid. Some also have transfer case fluid. Like engine oil and transmission fluid, there are different specifications for different vehicles. Your shop software will give you lube specs and service intervals.



Brake Fluid:

Like engine oil there are specific type of brake fluid specific to certain models of cars. Dot means department of transportation. Dot 4 will have a higher boiling point than dot 3. Brake fluid must stay fluid in lower temperatures as well. The shop software should give you the intervals that brake fluid should be exchanged, as well as the type of fluid it will require. The cap on the brake master cylinder reservoir should also state which type of fluid is required.

- When filling or dealing with brake fluid note that it will damage the paint on a vehicle.
- If the wrong fluid is used by mistake, it can cause brake component failure.

It is important to change brake fluid at the proper intervals as over time water from the air can be absorbed causing the fluid to break down and not preform properly.



Essential Fluids In Vehicles

Engine coolant or antifreeze:

Though coolant and antifreeze are often used interchangeably, they are not the same. Antifreeze is made of ethylene glycol or propylene glycol and is the basic ingredient, but it has to be mixed with water to create coolant, which is the cocktail you will find in the cooling systems of all water cooled engines. A hydrometer should be used to measure the strength of radiator fluid. Coolant has also been vehicle specific, but now days most antifreeze will be universal and good for all models.

The exchange interval for this fluid is typically every 2 years or vehicle manufacturer maintenance schedule.



Essential Fluids In Vehicles

Particular caution should be used when checking antifreeze or radiator levels on a hot engine as pressure from the radiator can cause fluid to rapidly escape radiator causing severe burns. I have learned to either check when vehicle is cold or to see if there is pressure on the top radiator hose before removing radiator cap. The radiator overflow jug is usually where you check the antifreeze level. When removing the radiator cap, you will find the cap is spring loaded with a second release point for safety to prevent burns. Note! the radiator cap will be hot when the engine is hot. Use a shop towel to protect hands and carefully turn the cap when releasing pressure. Always start the engine when adding coolant or water to radiator to prevent cold water in a hot engine block that can crack the block. When an engine is overheated and you want to cool off quickly before removing cap, use a water hose to cool radiator and before removing cap. Note! caution should be used when pouring coolant into a running hot vehicle as sometimes it will fill quickly causing to expel quickly.

Essential Fluids In Vehicles

Windshield washer fluid:

You can use a solvent in the washer reservoir but can freeze in the winter if the proper non freezing additive is not used. You can use a premixed windshield washer fluid that will not freeze until -20 degrees Fahrenheit. It is particularly important in winter and snow conditions to make sure the proper windshield washer fluid is in the reservoir as it can freeze if improper mix.



Dashboard warning lights:

Vehicle owners manual should explain dashboard warning lights.

The lights could include the following:

- Check engine light, should be the shape of an engine illuminated in an amber color
- Battery light, should look like a red battery showing the positive and negative post
- Coolant Temperature, should look like a thermometer in water

Essential Fluids In Vehicles

- Transmission Temperature, should look like a thermometer encircled by a round gear
- Oil pressure warning light, looks like a oil lamp illuminated in red
- Low tire light, should look like a cross section of a tire with an exclamation point in the middle
- Brake warning lights,

If it is red and says brake, usually to parking brake is engaged, or low on brake fluid.

If it looks like two half circles with a circle in the middle with an exclamation point, that usually indicates a worn brake pad.

If it says abs, that usually indicates an antilock brake issue

- Traction control, or stability control. Looks like a car with backward tire marks behind the car .
- Air bag warning light
- Lamp out
- Washer fluid, open door, low fuel

Whether it is an improperly closed door, or the check engine light, dashboard warning lights are how your vehicle communicates with you when something goes wrong and should never be ignored. They will light every time you start your vehicle but will go off when the systems are working properly.

Check Engine Lights

To properly diagnose a check engine light the first thing to do is to run a diagnostic scan to retrieve the trouble codes. Once you retrieve the trouble codes, then you can decide how to start the diagnostic and repair. In time you will be familiar with the most common codes on specific vehicles and know what the fix might be. So you now have the codes, you can log into All Data or Identifix to look up the code, possible causes and fixes. These software tools will give you the flow chart for more difficult diagnoses.

Since 1996 every car sold in America has been legally required to have an on board diagnostic system (OBD). This is a computer that monitors emissions levels and other vital engine components. The OBD scan is the first step in diagnosing the needed repair. If the Check engine light is blinking, It is really trying to get your attention. It usually means a misfire or a more serious condition that could cause the vehicle to not operate properly putting the driver at risk.



Check Engine Lights

The 10 most common problems that will trigger a check engine light include:

Oxygen sensor failure

Loose Fuel Cap

Catalytic Convertor

Spark Plugs, ignition coils

Mass Air Flow Sensor

After Market Alarm

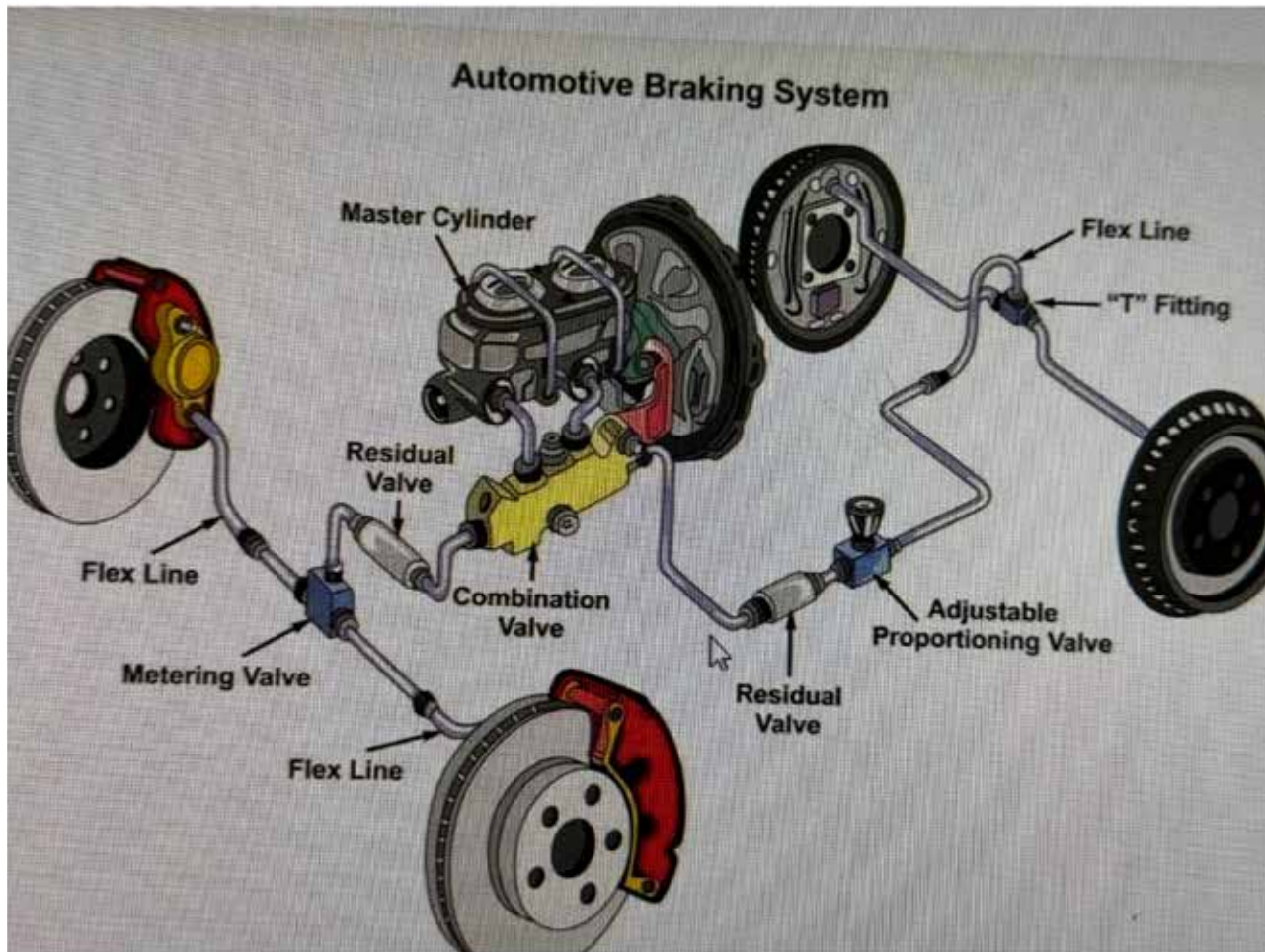
Evaporative System

Exhaust Gas Recovery System

Battery Voltage

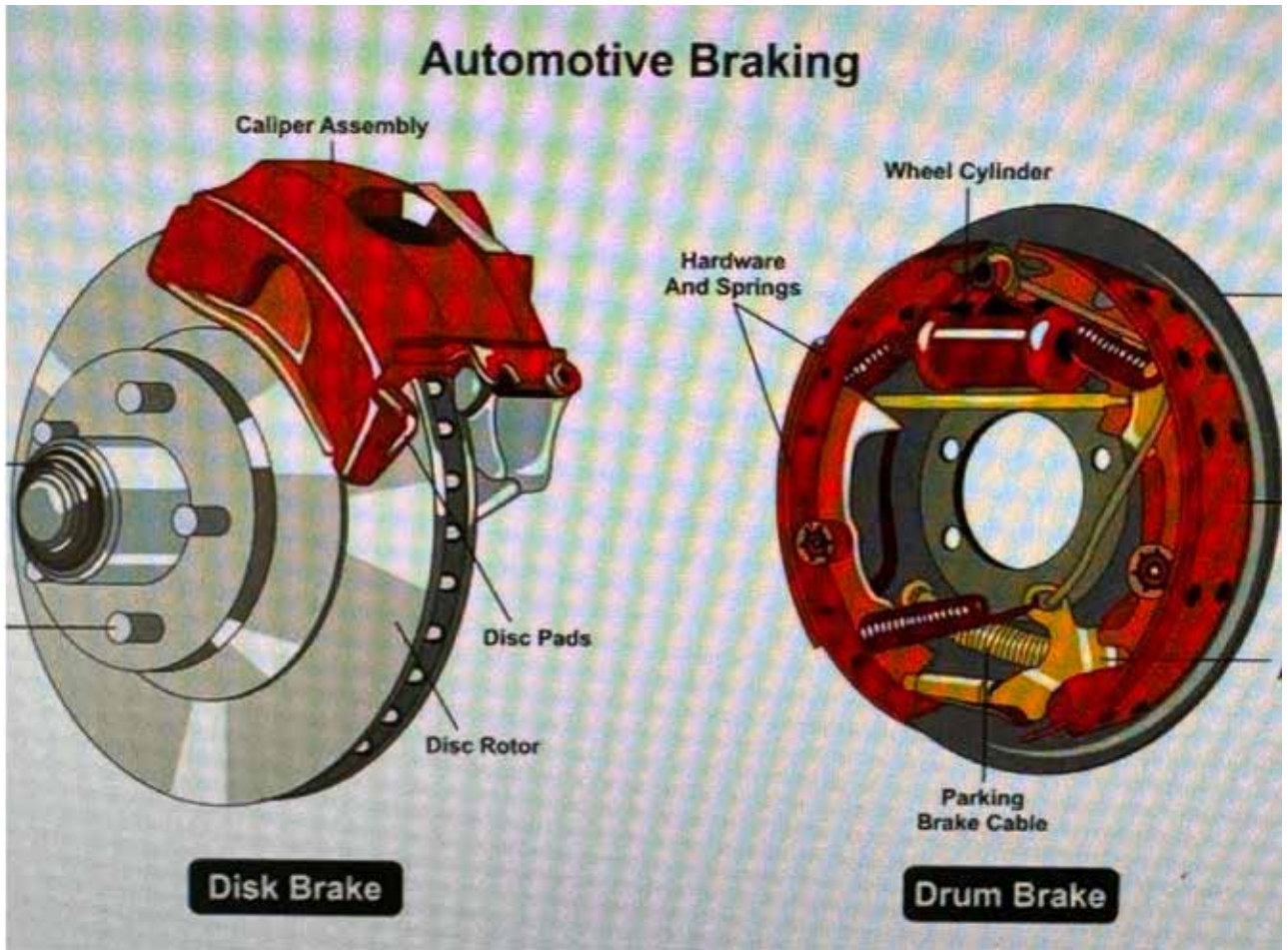
Vacum Leak

Brake Systems Explained

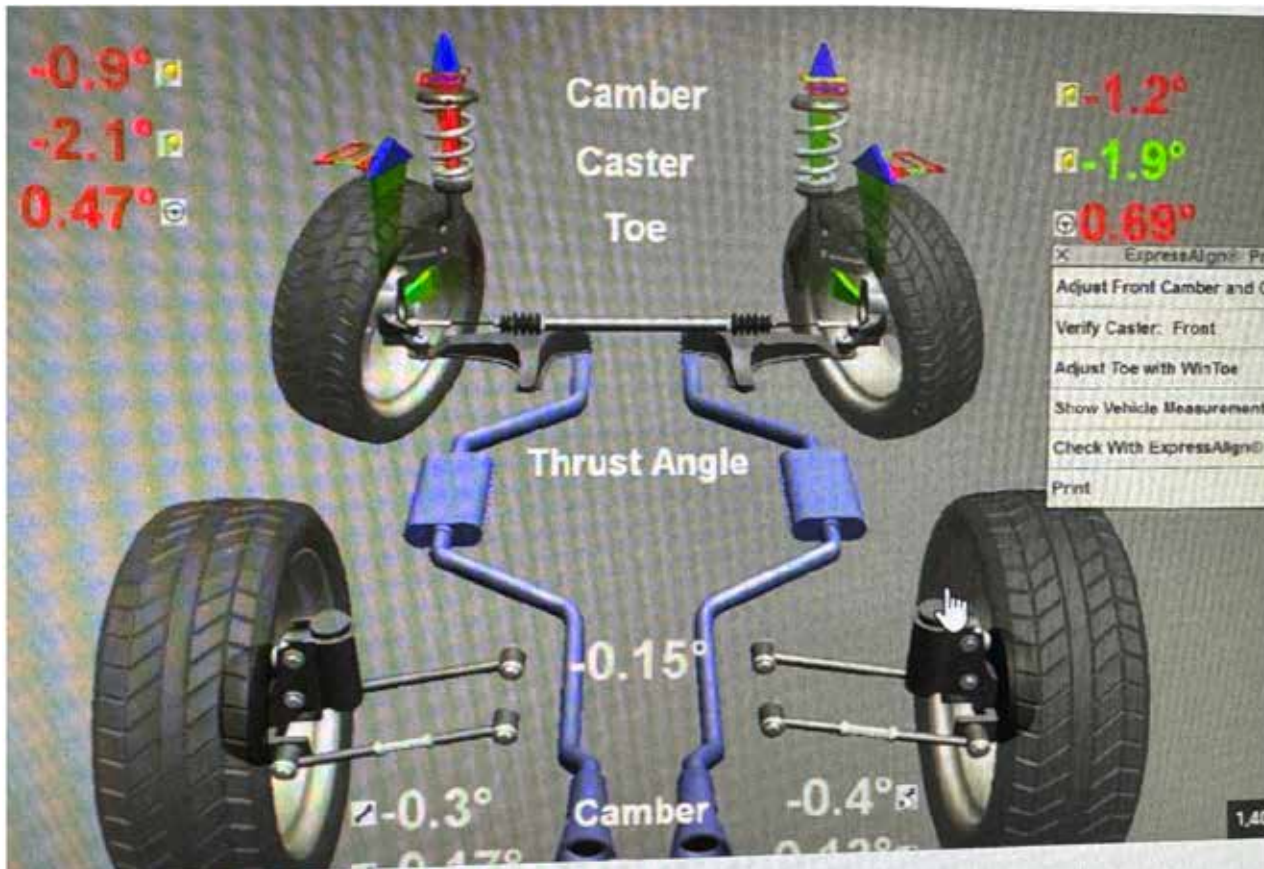


When you push the brake pedal with your foot, it initiates the braking process. The brake pedal is connected to the brake master cylinder, which is the heart of the braking system.

The Master cylinder sends brake fluid through the brake lines and hoses to all four wheels. The piston in the Master Cylinder allows hydraulic pressure to build in the brake lines. The pressure is transmitted to the calipers or wheel cylinders which is also a hydraulic chamber. The caliper or wheel cylinders force the brake pads or shoes against the rotors or drums. This friction is what slows the vehicle and stops the vehicle,



Wheel Alignment Explained



Wheel alignment is about the geometry of your chassis and suspension. For proper tire wear and optimum handling of a vehicle the wheels must be properly aligned. The above picture shows the front wheel pigeon toed in. Obviously they should be pointing straight ahead with the rear wheels following in the same track. The angles of alignment are camber, caster, toe in, thrust angle, Steering Axis Inclination (SAI).

The quickest wearing angle is toe and camber. More technical settings can include included angle, scrub radius, riding height, Steering center, Toe out on turns.