Six step troubleshooting process

Post a Comment. Accurate and consistent vehicle repairs do not happen by accident. They are the result of sound diagnostic practices and principles. The 6 step troubleshooting procedure is a time-proven, problem solving method. Step 1. Verify Concern. Before any troubleshooting process can progress beyond the first step, it is essential to verify the customer concern. To verify the concern, it may be neccesary to operate the vehicle under the same conditions the customer does when the problem occurs. In some cases, the only verification of a problem you may be able to obtain is the presence of a diagnostic trouble code DTC , which indicates a problem has accured. If any DTC are present, you should accurately record them on the repair order. Verification of a problem may also be limited to the presence of noises or other mechanical factors indicating a problem has accured. After verification and throughout the repair process, always keep the original customer concern in mind. Step 2. Determine Related Symptoms This step is a continuation of the first step because you are still gathering information and have not performed any repairs. Sometimes the actual fault conditions causing a customer concern effect other systems as well. Qonsequently, the repair process should include operational checks pf all vehicle systems that are related to the oroginal problem. Refer to service information and any diagrams to determine how they may be related. You should be aware of problems that effect only a single function of a system, an entire system, or multiple systems. If you identify multiple problems, attempt to determine how they may be related. When systems share common component, a single repair can often correct multiple conditions. Step 3. Analyze the Symptoms Step 3 is dependent of verification of the problem and builds on the information gathered from ste p 1 and 2. During this step, you determine what component are required for the affected system to operate properly by using service information. Whenever possible, you should use the proper diagnostic tools to verify the operation of each component or system. Each item that functions properly can likely be ruled out as a possible causes of faulty operation. Use service information to identify the components required for proper operation. Use diagnostic tools verify components and system operation. When you have an electrical problem, some of the things you should monitor and attempt to verify are :. The supporting module or modules are active. The supporting switch and sensor states can be detected and are correct. The supporting outputs or devices can be actuated and are working correctly. For mechanical problems, verify that :. The system operates as intended. The supporting components are functioning and direct. No bent, broken, or misalignment components are present. Refer to the possible causes listed in service information for a description of the conditions that cause the specific DTC to set. With this information, you can then use the diagnostics tools to either associate the DTC to the problem, or clear the vehicle systems and circuits listed in the possible causes section as the causes of the DTC. The more complete your interrogation of the vehicle is, the more time you will save letter. Associate the DTC to the problem. Clear the vehicle systems and circuits listed as the causes of that DTC. During this step, you should :. Develop an action plan It is important to know specifically what must be verified about the vehicle systems based on your interrogation before beginning. I f possible, identify any components test procedures from service information that may help you identify suspected components. Step 4. Isolate the Cause. Depending on the problem, step 4 can have many variables. If proper planning was performed during step 3, this step should provide positive results. Isolate a single components. Disassemble part of the vehicle. If traced to a specific component, subtitute that part with a known good part. Be aware that swapping certain modules on CAN bus vehicles can result in the loss of the vehicle b uild configuration, which can disabled the vehicle. During the isolating the cause phase of the repair process, you must be constanly aware of any vehicle conditions that have changed. Step 5. Repair the Concern If all the other steps have been done correctly, this should isually consist of :. Replacing the faulty component that was the source of the problem. Repairing any wire connections or harness required. Reinstalling and securing all removed components. You should consider the cause of the fault condition when making repairs. For example, if incorrect routing of the wiring caused the problem, the repair should include recolating the harness to the correct location to provent the problem from reccuring. Or, if water intrusion caused the condition, you must address the cause of the water entry. Step 6. Verify Vehicle Operation. This step may require operating the vehicle through the same conditions as steps 1 and 2. All vehicle systems should be tested, including those that were not officially part of the repair, to determine if the repair procedure caused any undesirable conditions. Always after the repair is complete test Drive performed. Share this post. Newer Post Older Post Home. Subscribe to: Post Comments Atom. Sponsored links. About Contact Terms Privacy Disclaimer. June 19, Two factors make for successful troubleshooting: extensive computer knowledge and an understanding of human psychology. You must understand how hardware and software work to troubleshoot them. You also must treat customers with respect. By combining these two

factors, you can quickly detect and solve computer problems. To best accomplish this, PC technicians will implement a troubleshooting methodology or maybe more than one. As you attempt to troubleshoot computer issues, think in terms of that six-step process. Plug the problem directly into these steps. For Step 2, a possible theory could be that the computer is not plugged in to the AC outlet. To test the theory in Step 3, you would plug the computer in. When you have reached a theory that tests positive, move on to Step 4 and establish the plan of action based on that theory, and then implement your solution. Keep in mind that many plans of action will be more complicated than just plugging the computer in! Perhaps the AC outlet was loose, which would require a licensed electrician to fix it. Next, in Step 5 you want to test. Always test and verify that the system is functioning correctly. Finally, in Step 6, you want to document your findings and the outcome. In many companies, documentation begins right when you first get a troubleshooting call or trouble ticket , and the documentation continues throughout the entire process. Be sure to keep track of what happened, why it happened, and how you fixed the problem. Because computer failures happen to the customer who usually is less technically aware than you of the possible causes for the problem , you must work with the customer to create a complete list of symptoms so that you can find the right solution quickly and accurately. Anything from new hardware or software being installed, new telephone or network being installed, or even a new coffee maker or air-conditioning unit could be at the root of the problem. Troubleshooting is an art because every technician will bring his or her own experience and personality to the task. Troubleshooting is also a science because you can apply a definite method that will bring you a great degree of success. Note: Windows generates several log files during routine use that can be useful for determining what went wrong. Many of these can be viewed through the Event Viewer. The Event Viewer captures three types of information: Application errors, security audits, and system errors. Post a Comment. Troubleshooting is a skill one must develop if you are to be proficient in the operation of a station or equipment. Good troubleshooting is not a talent with which a person is born, however, it is a skill acquired by anyone with a suitable background. You can become a good troubleshooter if you have:. Logical trouble shooting does not recognize "Easter-egging," "cook-booking," or "trial-and-error" methods. The "Easter-egger" makes unsupported guesses as to the location of the trouble. The "cook-booker" looks for trouble-locating clues in the trouble chart of the technical manuals, and is lost if the manual does not cover the particular fault. The "trial-and-error" technician starts at one end of the equipment and works towards the other end with component checkers and test equipment. If any of the three finds the trouble in a reasonable length of time, they are lucky: finding the one bad part or wire or connection among hundreds or thousands is not easy to do by illogical methods. Logical troubleshooting is a time-proven procedure used by all accomplished technicians. Most of them have applied the procedure so often that they no longer pay attention to its fine points. Through habit and years of experience, they may have forgotten its specific details. Probably no two technicians would explain the procedure alike, but all would agree that logical troubleshooting consists of sequential steps that systematically isolate the trouble to the faulty part. Some would list the procedure in three or four steps; others would count a dozen, fifteen or more. Regardless of the number, the principle would be the same. The procedure chosen as the easiest method of learning and applying the techniques was these Six Steps:. This diagram not only shows the steps but what you need in your toolbox to be successful. Even though a person had informed you there was a potential failure in the system, the best technicians always do a through operational checkout to confirm the original complaint. The first step is any troubleshooting problem is recognition of a trouble indication. Recognizing a trouble exists in equipments is not always easy to do since conditions of less than peak performance are not always apparent. Decreased sensitivity in a super heterodyne receiver, lower transmitter power, and slight distortion in audio equipment are just a few of the hundreds of examples. Each of these is a trouble symptom that requires recognition. You are notified of problems in many ways. These usually include complete or almost complete operational tests of the equipment. Malfunction of the equipment or any part of the equipment requires immediate attention. Troubles not easily noticed are those that cause degradation in equipment performance. A mile radar that only reached out to 50 miles, a watt transmitter only capable of 87 watts, a multi-meter reading that provides readings that are 10 percent off, or a noisy telemeter record are examples of equipment faults that are difficult to recognize because there is no visible or audible indication that say they exist. The owners depend on full performance equipment; the technician must locate the trouble and effect repairs in a timely manner. If you make a point of looking for these "hidden" trouble symptoms every time you touch the equipment, most of the symptoms of degraded performance have a recognizable signature. Compare performance between two similar equipments. Make the performance standard checks located in the equipment manuals.

Verify changes in performance since the last time you repaired, tuned, calibrated, or aligned the equipment. While troubleshooting, you can look for, and probably find, symptoms that signify degraded performance. If you look for the degraded performance, you will find it, if it exists. Breaking out the test equipment and equipment prints and proceeding headlong into troubleshooting on just the original identify of a trouble symptom is a very doubtful procedure. It could also be an unnecessary expenditure of energy. A dead scope, noise in a receiver, a zero reading on a panel meter or a missing time pulse by itself is not sufficient identification of a trouble symptom. There is a tendency among non-competent technicians to attempt a solution of a troubleshooting problem before they have completely defined it. The procedures for symptom elaboration are dependent upon the available aids designed into the equipment and the nature of the original symptom. Troubleshooting aids include front panel controls and observing built in indicators. Obtain additional information about most malfunctions by a systematic front panel check. If you have good knowledge of how the equipment works, manipulation of appropriate controls and switches and corresponding checks of the equipment meters and indications will reveal how the trouble is affecting the entire equipment. From these clues, you can narrow down the probable areas of the equipment that could contain the trouble. The third step requires that you make an "educated guess" to identify the probable cause of the trouble. From the trouble symptoms, as you have identified them, you determine the most logical locations of the trouble. Typically, problem locations are limited to the major subdivisions of the equipment, the functional units. The term "function" or "functional unit" is used to denote and electronic operation performed by a specific area of an equipment; for example, functions may be entitled transmitter, receiver, modulator, or power supply. These functions combined together, make up an equipment set transceiver set, radar set, sonar set, etc. However, there are occasions when one or more circuits for a particular function may be physically located on more than one indicated unit or even more than one printed circuit board. Make "educated guesses" from your knowledge of how the equipment works and a study of the equipment's functional block diagram. An educated guess made because the history of faults in that equipment in not acceptable. As an example, assume there is no receiver audio from a remote amplifier. Your "educated guess" should include that audio path from the receiver to the remote amplifier as well as the remote amplifier itself. An unacceptable educated guess would be a bad transistor because of the fault history. You still have to find that bad component. The purpose here is to use valid reasoning to identify all probable, technically sensible functional areas, which could contain the trouble. It may be well that the specific trouble is a bad transistor, but the wholesale transistor substitution takes a lot of time and can introduce additional troubles, particularly in circuits with critical tolerances. Do not worry if your find your lists of "suspects" are incomplete; even accomplished technicians may not be able to list all the functional units that are probably sources of the trouble. Your lists will improve with practice until you do not have to write the suspects down, but instinctively know which units hold the troubled component. On the other hand, do not worry if you end up with a list that is only one item. In well-designed equipment, you will often be able to name the one functional unit causing the problem. In this step, you select one of the "suspect" functions for testing. Your first choice is not necessarily the one you thought of first or the one that experience suggests as being the most probable. Select the first functional unit tested on probability and on the difficulties involved in making the necessary tests. Under some circumstances, you might decide to test the second most probable "suspect", rather than the most probable, because the later might involve testing difficulties that should be initially avoided or require tampering with circuit adjustments that might later prove to have been unnecessary. Like all the others, this step in the troubleshooting procedure places an emphasis on common-sense thinking rather than resultant action. If you do your preliminary work properly, manual work in gaining access to tests points and using test equipment can be limited to a bare minimum. After selecting the order in which you will check the units you have listed, you proceed to verify your first selection. Typically, this check is an output test point on the selected unit. Compare the test equipment reading with the normal signal described in the technical manual. A "no output" condition is relatively easy to recognize. Check for a distorted or abnormal output before arriving at a technical conclusion. Upon completing a verification of the probable faulty unit you have selected, you will arrive at one of several conclusions. The test will verify that:. Whatever your conclusion, you have discovered information that can be used to substantiate or eliminate suspected units on your list or provide evidence for adding another. Continue the tests of suspected unit outputs until you identify the single faulty unit. You have narrowed down the trouble to a fraction of the total number of circuits and parts in the equipment. If you have this much of the procedure properly, you can confine your search to the functional area you have isolated. Note: You can eliminate this step if your symptom elaboration definitely identified one

faulty unit. The next steps after you have isolated the faulty function or functional area is to identify the faulty circuit. Use the same narrowing down procedures as before. First you divide the functional unit into circuit groups IF strip, mixer, discriminator, amplifier, etc. You then examine each circuit group as if it could contain the fault. Finally, you make tests to isolate the faulty circuit group without going through the unnecessary, time-wasting chore of testing every test-point, from one end of the unit to another. In narrowing down the trouble to a single functional group of circuits, you can employ a process called "bracketing, Next you select points at you can test to isolate or eliminate portions of the unit. As each test is made, an input or output bracket is moved to the point in the block diagram where the test was made. In this manner, the closing brackets systematically narrow the fault to a single circuit. In selecting a point on a detailed block diagram to which one of the brackets is to move, you must consider two things - the characteristics of the improper output signal and the types of signal paths contained in the unit. The measured wave shape of a signal has certain characteristics - voltage, rise-time, noise content, frequency, etc. When these characteristics are in accordance with the designated standards, the signal is good. A bad signal characteristic can reveal clues that will help to identify a circuit group whose function is to originate or control that portion of the wave shape. For example, the output of a unit normally is a saw tooth waveform with six pulses equally spaced on its slope. If the pulses are there but the slope is nonexistent or insufficient, the saw tooth generating and shaping circuits is suspect. If the proper slope was there but there were no pulses or an incorrect number of pulses, the pulse generating or controlling circuit groups probably contain the trouble. Consider the type of signal path contained in the unit before moving a bracket. In a linear signal path, the signal is through circuits connected in series. When identification of the faulty circuit group is difficult or impossible that is when the wave shape characteristics do not indicate the faulty circuit function , brackets move to successively smaller half-points in the linear string. Signals from two or more circuit channels that meet at a common point or a signal that leaves a common point to enter two or more channels are examples of convergent and divergent paths respectively Moving a bracket after making the appropriate test to the common point will separate the bad and the good signal paths. The remaining type - feedback - is the hardest type to troubleshoot. Open negative feedback circuits automatic gain or frequency control, active filtering, etc. Positive feedback loops regenerative receivers, oscillators are more difficult since the regeneration will not occur by removing the positive feedback. Signal insertion plus disabling of the feedback loop is effective in most cases. There are no hard and fast, systematic procedures for bracketing, but there are some realistic rules. Examine the characteristics of the faulty output to determine the circuit group function that either generates or controls the improper characteristic. Study the detailed block diagram to determine the least number of bracket moves that will isolate the faulty circuit. Such moves will be dependent on the types of signal paths contained in the unit and the electronic functions of the circuit groups that may be responsible for distortions contained in the unit's output. Move only one bracket at a time after verifying the suitability of the signal by making a test. If the test does not reveal sufficient information for a valid bracket move, make another "educated guess". Figure , a block diagram of a functional unit, illustrates a logical sequence for isolating a fault by this procedure. The servicing block diagram can serve as the instrument for the complete bracketing process. In some cases, it will be necessary to refer to a schematic diagram for information regarding location of test points. There is sufficient diagram information in the technical manual to support the bracketing procedure and preclude wasteful, unreliable, circuit-to-circuit checking; you must know the organization and content of the manual to make effective use of your time. The bracketing steps stop when you have isolated the trouble to a single circuit and verified that the output of this circuit is the cause of the original symptoms. The number game of hi low is a perfect example of half-splitting to find the number. The highest number is I hope you enjoy this little demonstration. You should have "guessed" the correct number in a maximum of 10 tries by half-splitting. This would be the analogy used in this half-splitting troubleshooting technique. The troubleshooting procedure thus far has narrowed the trouble to a single circuit consisting of a single active device. If there is no output from the circuit, voltage, and resistance checks are your best bets. However, if there is an output you can examine for distortions that will reveal the circuit parts that are most likely to be at fault minimizes these checks. Quite often, the waveform will identify the malfunction to be in a specific portion of the circuit. Make a study before replacing any parts. Once the faulty part is identified, do not replace it until you substantiate that it is causing the actual trouble. A suspected open resistor, shorted capacitor, detuned coil, or weak tube may not be the reason or the only reason for the faulty output of the circuit. Such a defect may have resulted from another trouble. If you replace the part without an adequate technical reason, you may not cure the problem. Analyze the failure before making the repair. Your Guess: Cheat