

You Teach, Why do Students not Learn? Part III

ATech has been involved in the electrical/electronics training programs of the major OEMs for the past 20 years. The vast majority of that involvement has been in designing and supplying the hardware for the programs; for example, the General Motors S.E.T. hardware. We have had very few opportunities to work with instructors as to presentation techniques, skill development, etc. During the entire 20 years there has been one constant refrain, "Our technicians cannot troubleshoot simple electrical problems". But yet, they always continue the same training processes and techniques while expecting different results. Recently a major OEM tested a large number of their dealership technicians and found that 40% could not troubleshoot a fault in a simple light bulb circuit! How can this be changed?



Equipment alone cannot solve the problem. While ATech has both software and hardware centered systems that emphasize troubleshooting techniques and practice, they cannot replace a knowledgeable instructor. If the instructor cannot troubleshoot the circuits and explain the troubleshooting process, satisfactory results will never be achieved. The OEM described above would probably have learned more if they had tested their instructors instead of the technicians. **Can you teach what you can not do?** Remember, the student isn't always at fault.

Why are good instructors so important to the learning process? Good instructors will analyze a student's questions and learning style and then modify the presentation to meet those needs. Sometimes just changing the wording of a question changes the student's comprehension level. Without the instructor, every student must adapt to the presentation style of a particular textbook, computer based or web based training program, etc.

ATech's 1800 series troubleshooting training system is in use in hundreds of training programs. Some OEMs and major industrial customers have limited its use because their instructors cannot troubleshoot the problems presented on the trainers. For example, one major fleet's instructors could not troubleshoot a high resistance in the ground path of a light bulb! Therefore the training program was simplified. A far better solution is to improve

the instructor's skill level.

Another piece of the solution is in the high school and college level automotive programs using Structured Skill Development and Discovery teaching techniques. In the first two articles of this series, problems related to geometry and physics have been used as illustrations. In this part, automotive electricity will be addressed. The last article closed with a question, "What do your new students already know about electricity?". Structured Skill Development requires that some common understanding of the subject be identified as a starting point to build on. In every group there will be one or two students who don't have this common level of understanding. They must be identified by the instructor and raised to the common level.

The most common form of direct current electricity and one that everyone has experienced has to be static electricity. This can be the starting point to explain how other forms of electricity are generated. For example, while static electricity is normally generated by mechanical friction, an automotive generator produces electricity by "magnetic friction". A magnetic field actually separates the electrons from the atoms in the same manner as mechanical friction. In either case, static or magnetic, motion is required to produce the separation. A battery generates electricity through chemical action. Acid acting on the metal parts of the battery separates the electrons from the atoms.



Depending on the amount of friction and weather conditions, static electricity can produce voltages in the 1,000s of volts range. An individual who is charged with static electricity will carry that charge until they come in close contact with another person or a metal object. When the distance between the two has been reduced to a gap that can be jumped by the amount of stored charge (voltage), an arc occurs. This arc is the current flow produced by the static voltage charge which equalizes the charge between the



You Teach, Part III cont'd

two. While the arc can cause minor pain, surprise is the primary reason for the sudden movement of the individual.

Batteries are probably the second most common form of a direct current source. Common batteries are 1.5 volts, 9 volts, and 12 volts. The term

“volts” is commonly used in the identification of a particular battery. Everyone has replaced 1.5 and/or 9 volt batteries in some electrical or electronic device. When they did so they had to observe the polarity of the battery or, in the case of 9 volt batteries, the connector could only be connected one way. This is a key starting point to discuss the difference between direct current and alternating current. Most new students are also familiar with charging of batteries, primarily cell phone batteries.



What do new students know about normal alternating current supplied to their houses? They typically know it is 120 volts, light bulbs have wattage ratings, switches turn circuits on and off.

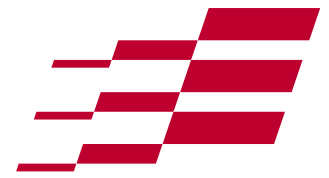
So far in this discussion, we have identified the following common knowledge elements concerning electricity that your new students possess:

1. A static electricity arc “hurts” because of current flow.
2. The ability of static electricity to jump a gap is dependent on the level of charge (voltage).
3. Batteries are rated by volts.
4. Batteries have a directional property (polarity).
5. Some batteries can be recharged.
6. House electricity is also rated in volts.
7. Light bulbs have power (wattage) ratings and that determines their light output.
8. Devices called switches control the circuits.



You can start your electrical section with Ohm's Law, series circuits, parallel circuits, math calculations, and lengthy lectures or you can take these identified common knowledge elements and build on them. If you were the student, which would you like?

Fred Hines



SkillsUSA®



The Automotive Services Technical Committee for Skills USA asked ATech to provide some advanced testing stations for the 2005 contest. ATech provided both Antilock Brake / Traction Control and Electrical stations. We would like to thank MAC tools for supplying scan tools and meters for the ATech stations.



Battery Testing 101?



April 2005 Invitational Workshop



Left to Right:

Gary McConnell - Baker College of Owosso, MI; Lloyd Mills - Hannah More High School, MD; Ralph Nodwell - Van Buren Public School System, MI; James Tice - Somerset Tire Service, NJ; John Cross - Community High School of Vermont, VT; Craig Buchanan - Walla Walla High School, WA; Stephen Small - Chabot College, CA; Verlin Tucker - Cleveland High School, TN; Jacky Livingston - TN Technology Center @ Elizabethton, TN; Clairene Terry - Carl Schurz High School, IL; David Morgenstern - Illinois Central College, IL; Keith Kraehmer - Mazda, IL; Shane Sampson - Western Iowa Tech Community College, IA; Jimmy Black - Sandhills Community College, NC; Chris Clevon - WyoTech, WY; Steven Gruchacz - Norfolk Skills Center, VA; Don Greer - Trenholm State Tech College, AL; Hollis Fenn - Barnwell County Career Center, SC; John Hatton - Cincinnati State Tech & Community College, OH; Si Acuna - Texas State Technical College, TX; Ken Syriac - Chicopee Comprehensive High School, MA; John Gavinski - Mid-State Technical College, WI; Robert Spencer - Tyler Junior College, TX; and Steve Tomory - Rio Hondo College, CA

Troubleshooting Contest Winners



Laura Lyons-ATech CEO, Shane Sampson, Chris Clevon, Keith Kraehmer, James Tice, and Gene Brown-ATech VP

The April 2005 ATech/AIPC Workshop was a special event in a number of ways:

The troubleshooting contest resulted in a tie between the two teams pictured. This was first time that had ever happened. Two additional AutoTap scan tools were

Awards/Graduation Dinner



Ron Pyle-ASA President

awarded.

A second female automotive instructor, Clairene Terry attended the Workshops. The first was Jessica Levy.

Mr. Ron Pyle - ASA President addressed the awards/graduation dinner as to NASTF and the pending Right to Repair Legislation.

June 2005 Invitational Workshop



Left to Right:

Robert McBride – Hanover High School, VA; John Christian – Northeast Kansas Technical College, KS; John Berkheimer – Thaddeus Stevens College of Tech, PA; Charles Case – Ogeechee Technical College, GA; Terence Drummond – Southern Durham High School, NC; Daniel Vaughan – Griffin Technical College, GA; Keith Mains – Cincinnati State Tech & Community College, OH; Jody Keegan – Sentinel Career Center, OH; Sonnie Meredith – Spoon River College, IL; Tony Martin – University of Alaska Southeast, AK; Jim Armstrong – Kaw Area Technical School, KS; Benny Dement – Arkansas Career Training Institute, AR; Arminio Lopes – Greater New Bedford Regional Vocational High School, MA; Buddy Griffin – Eastside Technical Center, KY; Vernon Thompson – Harford Technical High School, MD; Jay Leuck – Clackamas Community College, OR; William Fisher – Buckeye Joint Vocational School, OH; Bob Klauer – Metro Tech High School, AZ; Harlan Wrenn – Southside Virginia Community College, VA; Don Sykora – Morton College, IL; Jay O’Hair, Eastside Technical Center, KY

Awards/Graduation Dinner



Mary Hutchinson, NATEF Executive Director

The June 2005 ATech/AIPC Workshop was a special event in a number of ways:

The OBDII section was presented by ATech President Fred Hines who had missed the last workshop due to cancer surgery/treatment.

Due to the generosity of the AutoTap company, every attendee was given an AutoTap scan tool with enhanced parameter software for General Motors, Ford, and DaimlerChrysler. This was in addition to the normal

Troubleshooting Contest Winners



Gene Brown-ATech VP, Keith Mains-Cincinnati State Tech & Community College, OH, Tony Martin – University of Alaska Southeast \$1,000 of training materials that is given by ATech in every workshop.

Mary Hutchinson, Executive Director of NATEF addressed the Awards/Graduation dinner as to the changes in the 2005 task list and standards.

Six spouses accompanied their husbands, Kimberlee Fisher, Terry Griffin, Virginia Klauer, Betsy Mains, Kathy Vaughan, and Carol Wrenn. Thanks, ladies!

ATech 1800 Series Troubleshooting Trainer



“...Automotive Electricity/Electronics is a difficult subject for high school students...we’ve found that ATech trainers, with their hands-on approach, have kept the students on task for longer periods of time without getting bored. We’re looking forward to a greater percentage of our students mastering electrical/electronic tasks through use of the ATech system.”

Cape Cod Regional
Technical High School

ATech’s Electricity and Electronics programs include four (4) “hands on” courses developed specifically for automotive / autobody / truck students and technicians. These courses require ATech’s Troubleshooting Trainer – Model 1801B

PROGRAM COURSES:

- Automotive “Need-to-Know” Courses:**
 - **Automotive Electricity** – Model 1810A
 - **Automotive Electronics** – Model 1820A

- Automotive Technician Courses:**
 - **Automotive Sensors and Actuators** – Model 1830
 - **Automotive Computer Concepts** – Model 1840
(Requires 1802 Keypad)
 - **TP/MAP Component Board** – Model 1841

PROGRAM FEATURES:

- Used by Bosch, Ford, Chrysler, Nissan in U.S., Canada, Mexico, China, Brazil, Taiwan, Australia, Chile, and Vietnam
- Used by hundreds of public and private schools since 1986
- Includes On-Trainer, Troubleshooting, and In-Shop Worksheets
- A proven product for over 15 years
- Modular Design – Easy Updating
 - Fault Board – Model 1800FB
 - Interactive Keypad – Model 1802
 - Computer Based Instruction Models 1810W, 1820W

Snap-on Tools

ATech is pleased to announce the completion of an agreement with Snap-on Tools to represent ATech products in both the United States and the International markets. For the last four years, individuals within the Snap-on organization have contacted ATech asking if we would sell our products to Snap-on for international projects. After several months of meetings and discussions, the agreement was finally completed in June of 2005.

When any organization compares ATech products to those of our competitors, the technical sophistication, real world performance, and quality of the products along with the realistic delivery schedule provided by ATech are without equal. ATech does not have to tell organizations these facts, they tell us after they perform their evaluations.

It will be exciting to see what impact two quality companies, Snap-on and ATech, working together can have on the quality of automotive training programs world wide. We hope to have representatives from Snap-On participate in each of the upcoming ATech/AIPC workshops. They will bring a completely new perspective to the workshops along with additional technical expertise.

GM 3.4L Cutaway

A Tech model 680

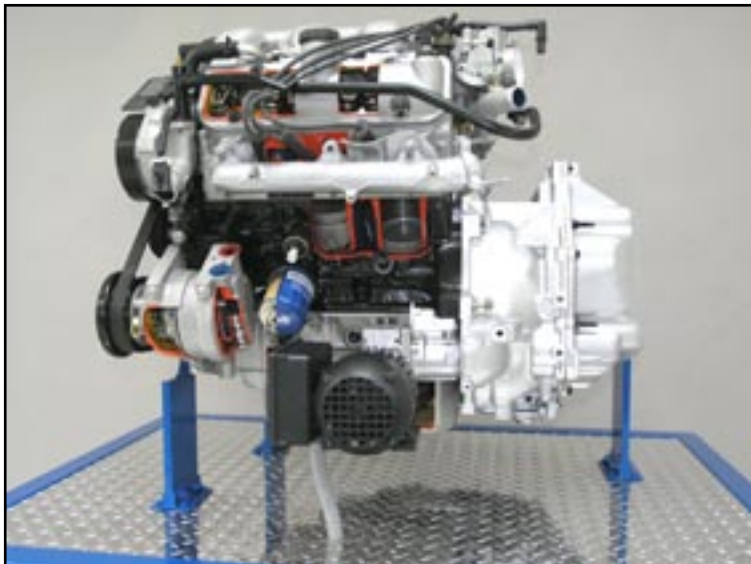
Instructor Questions



Front Quadrant View



Rear Quadrant View



Rear View Showing Drive Motor

A Tech continually receives questions from instructors asking for help with other companies' trainers. They come to us because they get no response from the other companies. We receive so many that I believe it is a very common problem. In this and future issues of the Newsletter, I am going to publicly respond to some of the questions because, for every question we receive, I am sure there are many other instructors in the same situation but are too ashamed to ask for help or have given up hope. I will also answer general questions related to A Tech's products and operation.

Will you repair _____ and _____ trainers?

Over the years, we have received requests concerning every other manufacturer's equipment as to the lack of support once the sale is made. We can not repair their training equipment nor can we help you obtain service from them. These topics should be written into any purchase contract with them with a buy back clause on non-compliance. A Tech considers our service to be as important as the original sale.

A previous instructor purchased an alleged OBDII trainer from _____. All it does is continually set fault codes. Is there any way to make this trainer execute a drive cycle and operate without fault codes?

There is no way without a complete redesign to make that trainer execute a drive cycle or operate realistically. The trainer is built as if it were a pre OBDII system. If you read their advertisements, they say it demonstrates common problems which is partially true. To realistically demonstrate problems, it should first be able to demonstrate realistic no fault code operation. Otherwise the system will operate in some form of "limp home" mode. The relationships of fuel trim, closed loop operation, and non-continuous monitors can not be demonstrated in any form of "limp home" mode. From a more technical stand point, you will never be able to retrieve realistic Mode 6 data from the trainer because you can never execute a drive cycle.

The school administrator purchased an OBDII trainer from _____. It has a hair dryer supplying air flow to the MAF which causes it to quickly set a MAF DTC when it is turned on. Is there any way to make this trainer operate realistically.

No. The value of MAF signal must be related to the throttle position, engine rpm, and engine load. The

Instructor Questions

use of any type of fan to produce a change in MAF will produce a DTC. You should ask to see a drive cycle demonstrated on any OBDII trainer you are considering purchasing. If it will complete a drive cycle and set all system flags, it is operating in a realistic manner.

I am ashamed to admit that we purchased an audio trainer from _____. It cost close to a \$1,000 and came with one activity in their courseware. Do you have curriculum that we could use with this trainer?

First, you should always ask to preview the curriculum for any training system you are considering. If the company won't supply it, don't buy the system. ATech's curriculum is specific to its training systems and would not correlate with any other. You will probably have to produce your own.

How can you give those ATech/AIPC workshops for free?

Each year I allocate a sum of money to be used in activities that give back to the individuals (automotive instructors) and industry that support ATech. We have been one of the primary sponsors of the Automotive Industry Planning Council (AIPC) for the last 5 years. It awards approximately \$500,000 dollars of training equipment and materials each year. For the last 2 years, we have been involved with the competition at SkillsUSA at their request.

The Workshops have been a goal of ATech for many years. It is a fantastic experience to be in the same room with 20 other instructors from all different levels and areas of automotive training. If you think you know the perfect way to teach a subject, you definitely need to attend one of our Workshops. You will probably find there is a better, more efficient way and/or you may help some other instructor improve a part of their program.

Each Workshop costs ATech about \$30,000. We have three a year and I consider the money well spent. Most instructors would not be able to attend without ATech covering all of the expenses.

Can I purchase stock in ATech Training Inc.?

I receive this question many times each year especially from Workshop attendees and consider it to be the greatest of compliments when people ask. ATech is a "S" Corporation with one shareholder. At this time, there is no intention to expand the number of shareholders.



National Teachers Hall of Fame Inductee

"Merle is a master automotive technician who has the patience and gentle, prodding demeanor to nudge all his students to do their best. Whether it is a student new to auto mechanics or more advanced students competing in and winning state and national trouble-shooting contests, all his students benefit from his knowledge and experience."

Albert J. Butler, Superintendent



Merle Saunders
Auto Technology, Vale High School, Vale, OR

Vale, Oregon Students Win High School Ford AAA



Kneeling L to R: Students Oliver Dalman, Matthew Whitaker
Standing L to R: John Nielsen, AAA; Instructor Merle Saunders; Steve DeAngelis, Ford



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A Tech Training is a member of:



Automotive Industry Planning Council



and Actively Supports:



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