

# AutoTeacher News

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## Teaching for Transfer!

What is the real goal of teaching electrical/electronic theory to students; so they can understand Ohm's Law or use a multimeter? Those two items are just steps to the final goal of developing troubleshooting skill. The ultimate goal of all automotive electrical teaching/training is to make the student a competent troubleshooter. "Teaching for Transfer" is a process to develop teaching techniques and strategies based on emphasizing a student's need to transfer classroom instruction into real world applications.

The first step in the process is to identify the actual final goal of the instruction. In this case it is troubleshooting ability. The next step is to look at real world situations and how technicians interact with them. The final step is to develop teaching and presentation formats to constantly work towards the real world situation.

For example, in electrical/electronic classes students are told to measure voltage drops across circuit components. They are allowed and in some cases instructed to do this by placing a meter probe on each side of the component. Compare this to the real world situation where most voltage measurements are made with one probe connected to chassis ground. Measurements on the job are made this way for two primary reasons; speed of problem resolution and practicality. Trying to back probe a connector with two probes at the same time is close to impossible unless you have three hands and four eyes.

The speed of troubleshooting issue requires a closer look. The circuit in Figure 1 has a problem. Performing the component voltage measurements shown in Figures 1, 2, 3, and 4 has shown the troubleshooter essentially nothing. After six probe connections it is still not known if the circuit has a voltage supply! Figures 1 and 2 illustrate that it cannot even be determined if the switch is good using the component measurements. From an efficiency stand point, all of the effort and time spent performing these measurements has been wasted!

Consider the alternative approach. In Figure 5, our first measurement shows that we have a voltage supply for the circuit. The measurement in Figure 6 shows the fuse is good and, by operat-

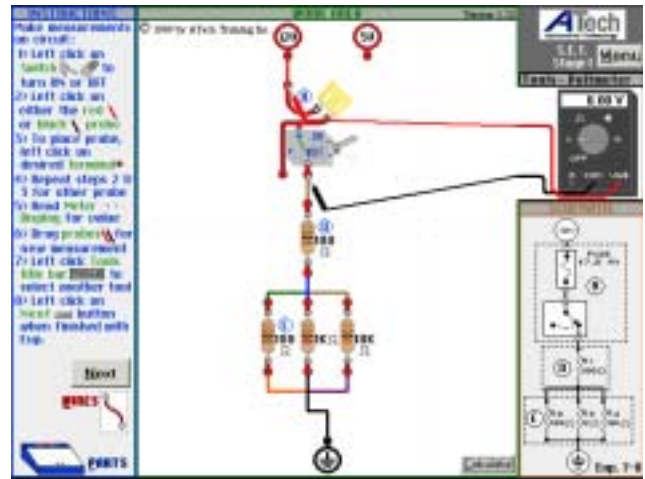


Figure 1

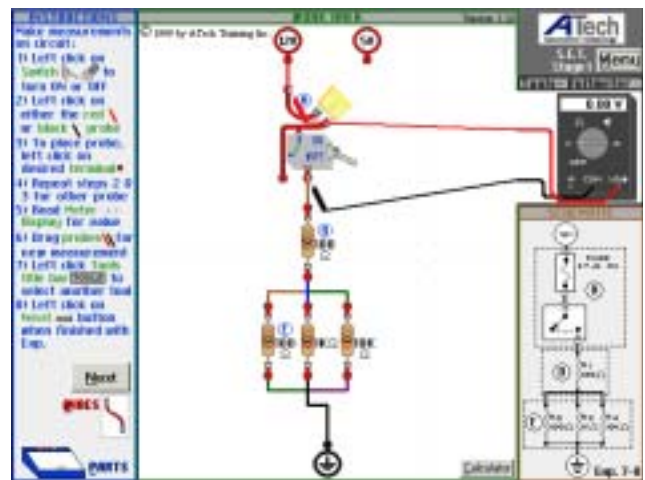


Figure 2

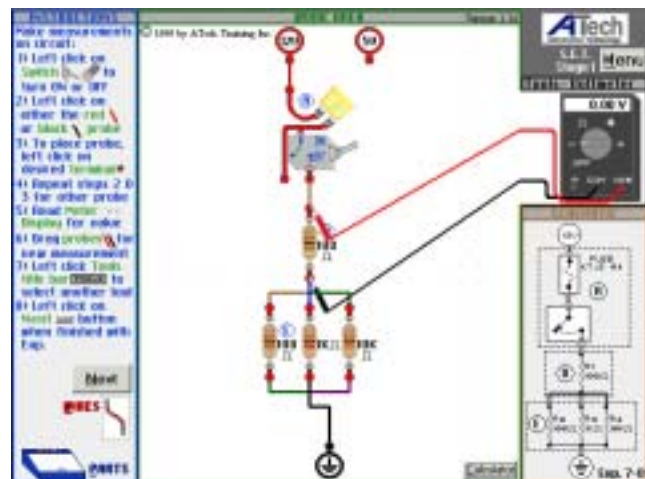


Figure 3

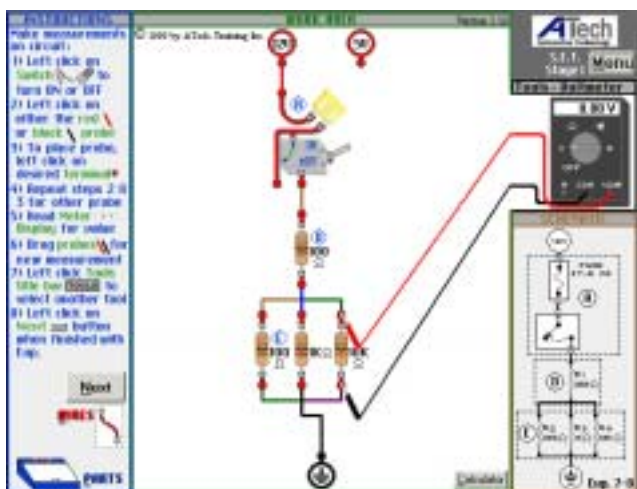


Figure 4

ing the switch while viewing the voltage measurement, it can be determined if the switch is faulty. So far, with only three probe moves, we have determined the circuit has a voltage supply, the

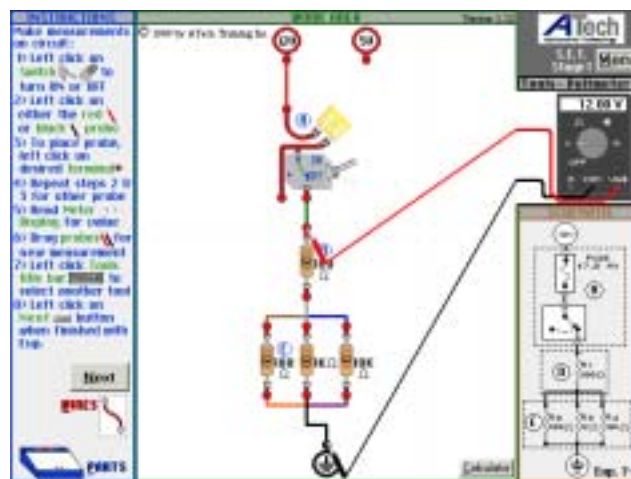


Figure 6

We would expect a voltage of less than six volts measured in Figure 7. The fact that the same voltage is measured on both sides of the Module D resistor indicates that there is no current flow

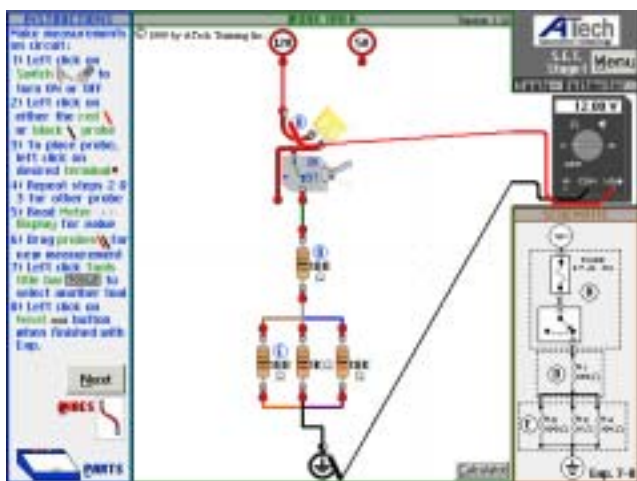


Figure 5

fuse is good, and the switch is good. On the fourth probe move, we get our first indication of where the fault is and what it might be. This is illustrated in Figure 7. What voltage would be expected at this point? The three resistor parallel combination would have an equivalent value of less than 100 ohms because the resistance of a parallel network must be smaller than the smallest resistor. In this case the smallest resistor is 100 ohms. The equivalent circuit for Module D and the parallel section would be a series circuit containing two resistors. One being the 100 ohm resistor of Module D in series with the resistance value of the parallel combination, which is less than 100 ohms. Two equal resistors in a series circuit produce a voltage at their connecting point of one half the supply.

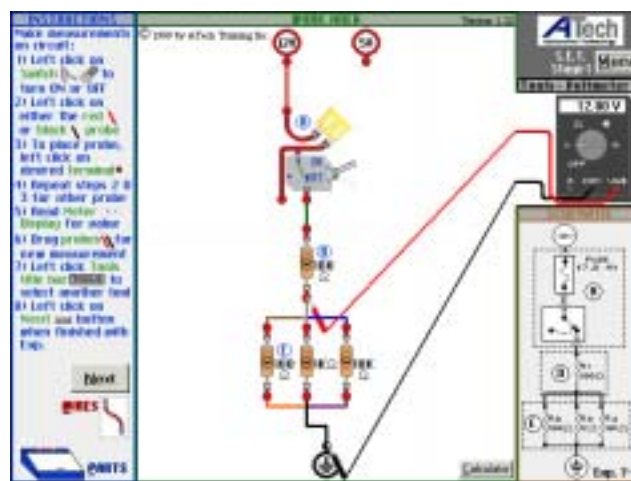


Figure 7

through the resistor. Based on what we know at this point, what are the possible faults? No current flow through the Module D resistor indicates a possible open circuit or a short to the supply voltage below the measurement point in Figure 7. The measurement in Figure 8 indicates the problem must be below the parallel resistors. In Figure 9, a measurement of 12 volts indicates there is an open circuit in the ground connection. There is a remote possibility that a short at the bottom of the parallel resistors to the 12 volt supply could have “blown” the ground connection resulting in the open. Therefore a check to eliminate that possibility is necessary before we repair the open. Flip the switch to the off position or pull the fuse. If the 12 volts is still present at the measurement points in Figure 9, there is a

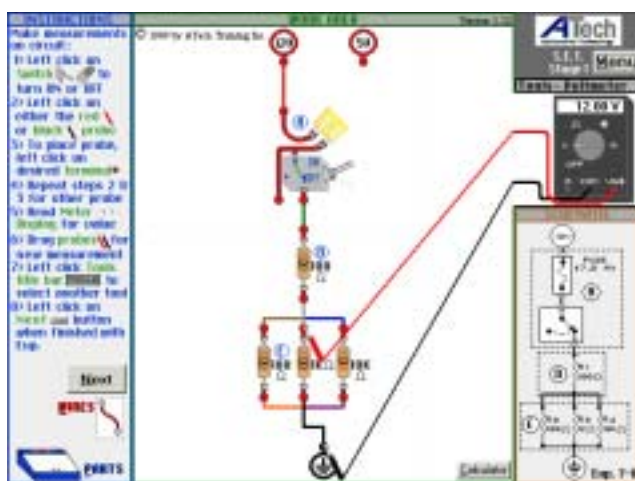


Figure 8

short to the 12 volt supply. If necessary, remove the short, fix the open and “job done”. In six probe moves the problem has been identified.

The “Teaching for Transfer” process mandates that students perform all voltage measurements in lab exercises and troubleshooting practice with one probe anchored to common ground. Restructure your presentations/demonstrations to emphasize one probe on ground measurements. After one measurement is made, ask your students what point should be measured next, why it should be measured, and what voltage would they expect at that point? Efficient, fast troubleshooting requires a logical thought process. The only way to develop that skill in a student is to practice. But ensure that the practice is using the correct methods. **We learn what we practice.**

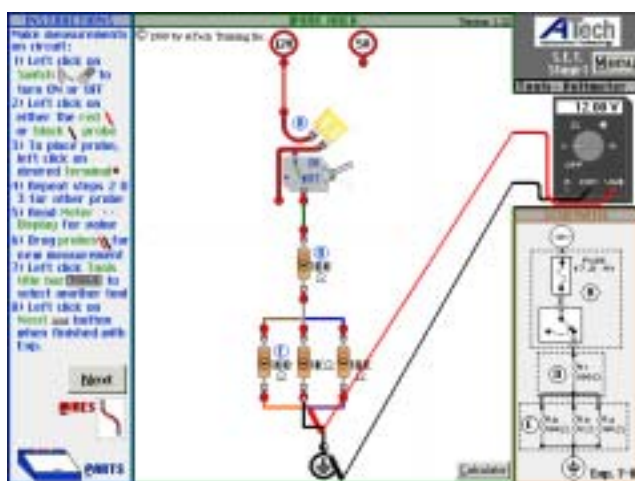
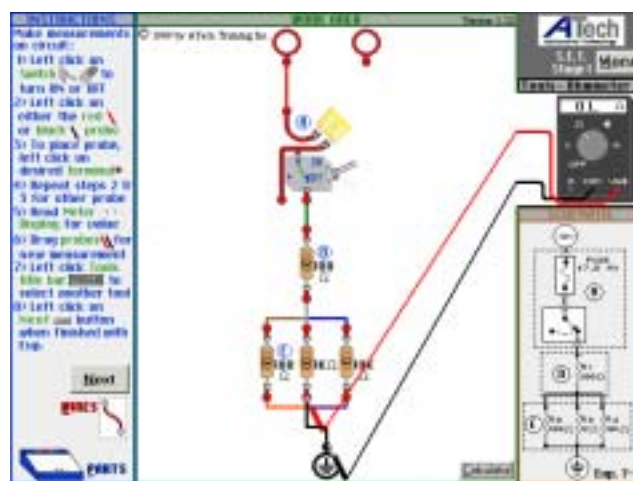


Figure 9

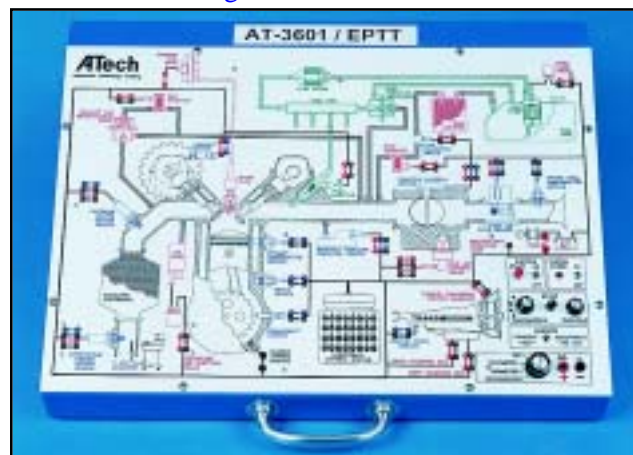
Discuss with your students the differences in voltage measurements that would have occurred if a short to voltage had existed at the bottom terminal of the switch or at the bottom of mod D?



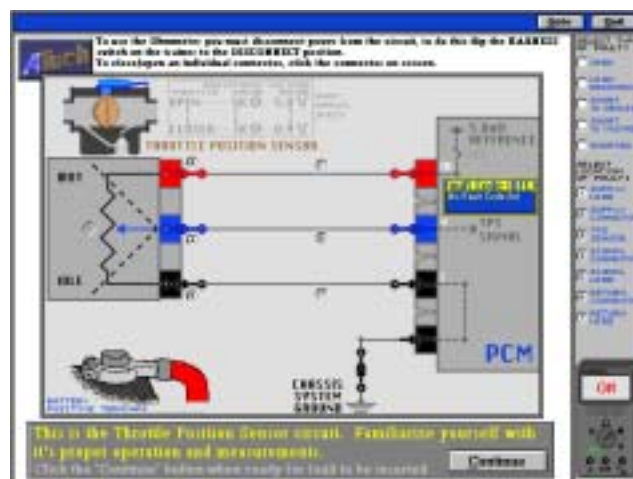
Open in Ground Confirmed

### 3600 Series Engine Performance Troubleshooting System

After your students have developed their electrical troubleshooting skills introduce them to ATech’s 3600 series. The three programs 3610, 3620, and 3630 apply the fundamental skills to troubleshooting engine control systems. Visit [www.atechtraining.com](http://www.atechtraining.com) for more details.



3601 Base Platform



3630 Engine Control Diagnostics

# 1800 Series - Automotive Electricity/Electronics



*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:

- Designed specifically for Automotive, not adapted from Electronics Technology program. Need to know information only, no extraneous subject material
- Used by 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 10 years
- Modular Design – Easy Updating
  - Fault Board – Model 1800FB
  - Interactive Keypad – Model 1802
  - Computer Based Instruction Models 1810W, 1820W

**FOR INFORMATION:  
CALL 859 / 485-7229  
FAX 859 / 485-7299**

**EMAIL: [sales@atechtraining.com](mailto:sales@atechtraining.com)**



## 2002 National Winners



From Left to Right:

Mary Hutchinson - Executive Director of NATEF, (AIPC Secretary)

Ron Chappell - Automotive Program Coordinator, Santa Fe CC, Gainesville, FL

Mario Schwarz - Automotive Instructor, Santa Fe CC, Gainesville, FL

William Baul - Automotive, Instructor, Richmond Technical Center, VA

Mike Godson - Automotive Instructor, Clark College (Toyota T-TEN), WA

Robert Jones - Automotive Dept. Head, Clark College (Toyota T-TEN), WA

Rick Ciesla - Global Technical Training, DaimlerChrysler, MI, (AIPC Treasurer)

Gene Pierce - Assistant Superintendent, Tuscola Intermediate School District, MI, (AIPC Education Chairman)

The Automotive Industry Planning Council is a national advisory group of industry leaders, vocational/technical educators, and educational policy makers whose mission is to promote communication, cooperation, and excellence in automotive service training programs. One of the methods they use to accomplish this mission is the Automotive Award of Excellence in Automotive Technician Training Program. Each year, all ASE/NATEF Certified Schools are invited to participate. State winners are recognized in three categories:

- Secondary Program
- Post Secondary - Generic Program
- Post Secondary - Manufacturer Affiliated Program

Programs eligible to apply are Automobile Technician, Collision Repair/Refinishing, and Medium/Heavy Duty Truck. The local entries are submitted to a State Coordinator where State winners are selected in each category. The State winners are then submitted to AIPC where a National winner and two runners up are selected in each category. The National winners receive their trophies/awards each year at the Association for Career and Technical Education Convention (ACTE). Each of this year's National winners received over \$55,000.00 in equipment for their programs. Donations were given by American Honda, ASE, ATech Training, DaimlerChrysler, NATEF, and The North American Council of Automotive teachers (NACAT). Additional information is available at [www.autoipc.org](http://www.autoipc.org)

# National Runners Up



## Secondary



From left to right:

Rick Ciesla - Global Training, DaimlerChrysler (AIPC Treasurer)  
Vince Saluzzo - East Valley Institute of Technology, Mesa, AZ  
Randy Baker - East Valley Institute of Technology, Mesa, AZ  
Denis Ashton - East Valley Institute of Technology, Mesa, AZ  
Tommy Powell - East Valley Institute of Technology, Mesa, AZ  
Russell Suprak - East Valley Institute of Technology, Mesa, AZ  
Mary Hutchinson - NATEF Executive Director (AIPC Secretary)

## Post Secondary, Generic



From left to right:

John Ball - American Honda, retired (AIPC Industrial Chairman, 2002)  
Jerry Clemons - Elizabethtown Technical College, Elizabethtown, KY  
Rick Ciesla - Global Training, DaimlerChrysler (AIPC Treasurer)  
Les Pike - Elizabethtown Technical College, Elizabethtown, KY  
Mary Hutchinson - NATEF Executive Director (AIPC Secretary)  
Doug Poteet - Elizabethtown Technical College, Elizabethtown, KY



From left to right:

John Ball - American Honda, retired (AIPC Industrial Chairman, 2002)  
Dave Davison - Great Plains Technology Center, OK  
Rick Ciesla - Global Training, DaimlerChrysler (AIPC Treasurer)  
Mary Hutchinson - NATEF Executive Director (AIPC Secretary)



From left to right:

John Ball - American Honda, retired (AIPC Industrial Chairman, 2002)  
Ralph Kelsey - Ivy Tech State College, Fort Wayne, IN  
Rick Ciesla - Global Training, DaimlerChrysler (AIPC Treasurer)  
Mary Hutchinson - NATEF Executive Director (AIPC Secretary)

## Secondary ( 1 through 5 )

Richmond Technical Center Richmond, VA  
East Valley Institute of Technology, Mesa, AZ  
Great Plains Technology Center, Lawton, OK  
NCW Tech Skills Center, Wenatchee, WA  
Platt Regional Vocational Technical School, Milford, CT

## Post Secondary, Generic( 1 through 5 )

Sante Fe Community College, Gainesville, FL  
Elizabethtown Technical College, Elizabethtown, KY  
Ivy Tech State College, Ft. Wayne, IN  
Delaware Technical & Community College, Georgetown, DE  
Skagit Valley College, Mount Vernon, WA

## State Winners

### Secondary

NCW Tech Skills Center, Wenatchee, WA  
 Tim Campbell  
 Platt Regional Vocational Technical School, Milford CT  
 Laurie LeBouthillier, Assistant Director  
 Franklin County High School, Carnesville, GA  
 Terry Wicker, Instructor

### Post Secondary, Generic

South Arkansas Community College, El Dorado, AR  
 Charles Woodward  
 College of Technology, Idaho State University, Pocatello, ID  
 Don Bemis  
 Advanced Technology Institute, Virginia Beach, VA  
 Richard Benedetto  
 Louisiana Tech, Young Memorial Campus, Morgan City, LA  
 Melanie Henry - Assistant Dean  
 Delaware Technical & Community College, Georgetown, DE  
 Sam Brittingham, Dept. Chair  
 North Iowa Area Community College, Mason City, IA  
 Gary Forbess, Chairperson  
 New England Institute of Technology, Warwick, RI  
 Christopher Bannister, Dept. Chair  
 Texas State Technical College - West Texas, Sweetwater, TX  
 Russell Carrigan, Instructor  
 Skagit Valley College, Mount Vernon, WA  
 R. Scott Hall, Dept Chair / Instructor

### Runners Up Receive Travel Funds

For the first time in the 19 year history of the AIPC's Awards of Excellence in Automotive Training program, the National Runners-Up received travel assistance to attend the awards dinner and presentation. ATech Training provided the funds for transportation and lodging of a representative of each Runner-Up school to attend. With the extra assistance from ATech, some schools were able to send more than one person.

Each year AIPC solicits equipment and cash donations for the winning schools. Therefore the prizes for each year's winners may differ. If you know of an organization that would be interested in participating in the donations program, send an email to [fhines@autoipc.org](mailto:fhines@autoipc.org).

Donations for the 2002 winners were made by American Honda, ASE, ATech Training, DaimlerChrysler, NACAT, and NATEF. For more information about the Automotive Industry Planning Council and this program visit [www.autoipc.org](http://www.autoipc.org)

## What They Won!

Each year the membership of the Automotive Industry Planning Council requests equipment and tool donations to be distributed to the winners of the Awards of Excellence in Automotive Training program. Therefore, each year's awards are different. Along with trophies and plaques, this year's winners received:

### National Category Winner

1. \$15,000.00 Snap-On Tool Certificate donated by ASE
2. \$5,000.00 Equipment Certificate donated by ATech Training Inc.
3. Two NACAT Conference Registration Fees donated by Dan Perrin and NACAT
4. A DaimlerChrysler Car donated by DaimlerChrysler
5. A Honda Car donated by Honda
6. \$1000.00 Travel Assistance Grant from AIPC

### National Category Runner Up

1. \$10,000.00 Snap-On Tool Certificate donated by ASE
2. \$2,500.00 Equipment Certificate donated by ATech Training Inc.
3. A DaimlerChrysler Car donated by DaimlerChrysler
4. A Honda Car donated by Honda
5. Air Transportation and Lodging at New York, New York Hotel in Las Vegas for a school representative donated by ATech Training Inc.

### State Winners

1. \$1,000.00 Snap-On Tool Certificate donated by ASE
2. \$1,000.00 Equipment Certificate donated by ATech Training Inc.



Awards Presentation at ACTE

From Left to Right:

Rick Ciesla - Global Technical Training, DaimlerChrysler, MI, (AIPC Treasurer)

Gene Pierce - Assistant Superintendent, Tuscola Intermediate School District, MI, (AIPC Education Chairman)

Mary Hutchinson - Executive Director of NATEF, (AIPC Secretary)



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ATech Training is a member of:



Automotive Industry Planning Council



Automotive Training Managers Council

And actively supports:



### Automotive Industry Planning Council Troubleshooting Skills Development

AutoIPC (AIPC) and ATech through a collaborative effort have made a free downloadable program available on [www.autoipc.org](http://www.autoipc.org). The program's purpose is to develop electrical troubleshooting skill in both technicians and students. It is free for you to use personally or in your classroom. All other copyright restrictions are maintained.

Two of AIPC's Areas of Concern are: "Reinforcement and support of existing training programs" and "Instructor Professional Development". This skill development program is the initial step in addressing these concerns. The program is a variation of the ATech Skills For Electrical/Electronic Troubleshooting (SEET) program. The variation allows faulted circuits to be displayed and diagnosed using standard virtual instruments. The program as downloaded contains one faulted circuit. New faults for the circuit and new circuits will be made available periodically on the AutoIPC website for downloading. Remember "All initial voltage measurements should be made with one probe connected to the common ground" as discussed in the lead article. Real World Skills come from Real World Practice.