

# HOW TO CONDUCT A PROFESSIONAL TECHNICIAN SKILLS COMPETITION

Developed by



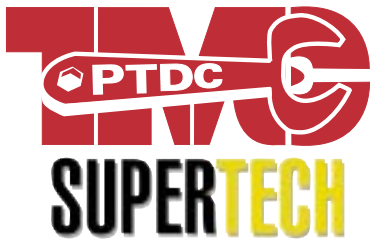
Professional Technician  
Development Committee



*A Guide to Holding a Technician Contest  
Based On TMC's National Technician Skills Competition*



Technology & Maintenance Council  
American Trucking Associations, Inc.



# BE PART OF TMC'S NATIONAL TECHNICIAN SKILLS COMPETITION !

Organize a state, local or corporate skills challenge!

## INTRODUCTION

The Technology & Maintenance Council's National Technician Skills Competition—TMCSuperTech—is an annual event held in conjunction with TMC's Fall Meeting. The event is organized by TMC's Professional Technician Development Committee (PTDC).



TMCSuperTech is North America's premier skills competition for professional commercial vehicle technicians. TMCSuperTech contestants come from all segments of the trucking industry, and many are state, regional, or corporate champions.

Because of the great interest shown by state trucking associations and maintenance councils, as well as trucking fleets and service/dealers, TMC has developed this manual to help organizations conduct their own technician skills competitions so that their local champions will be prepared for competition at the national level.

This document will:

- describe how TMCSuperTech is organized,
- offer guidelines on how organizations can establish and promote contests at a state/ regional or corporate level, and;
- detail how organizations can ensure their competition champion(s) registers to compete at the national level in TMCSuperTech.





# WHAT IS SUPERTECH ?



## DESCRIPTION

TMC's National Technician Skills Competition— TMC SuperTech— is an annual event held in conjunction with the Council's Fall Meeting. The Competition consists of a First Round Written Challenge and subsequent Hands-On Skills Challenge.

Contestants take part in the First Round Written Challenge on Day One of the competition. Following the Written Challenge, there is a reception at which TMC announces the names of a predetermined number of contestants who are eligible to compete on Day Two in the Hands-on Skills Challenge. The last day of the event consists of a Technician Training Fair (featuring numerous hands-on job related training classes that qualify for NATEF continuing education units), followed by an competition awards banquet.

## WHO MAY COMPETE

The competition is open to any actively employed commercial vehicle technician. However, all competitors must be TMC Technician Members. Active members are eligible to enter the competition without fee. Nonmembers will pay an entry fee and will become members for the remainder of the year. Verified champions of state trucking association technician skills competitions may enter without paying a fee. Grand Champions of previous TMC National Technician Skills Competitions are eligible to compete. [Membership forms available at <http://tmc.truckline.com> or by calling TMC offices at 703-838-1763.]





# HOW IS SUPERTECH ORGANIZED?

## REGISTRATION

TMC SuperTech registration forms can be found at <http://tmc.truckline.com>. Registration forms must be postmarked by a specific date set by TMC. Only preregistered contestants are eligible to compete. Contestants are sent a confirmation of their registration and housing accommodations in advance of the event.

## CONTEST LOCATION

TMC SuperTech events are co-located with the Council's fall meeting, which is typically held in September/October of each year. Check with TMC for the latest event schedule.

## CONTEST FORMAT

The National Technician Skills Competition and Technician Training Fair is held on Monday, Tuesday and Wednesday during TMC's Fall Meeting. The Orientation and First Round Written Challenge is held Monday afternoon. The First Round Written Challenge is followed by a reception Monday evening at which TMC announces the names of the contestants who have earned the right to compete in Tuesday's Hands-on Skills Chal-

lenge. Contestants with top scores (along with verified State Trucking Association Grand Champions) are eligible to compete in the Hands-on Skills Challenge beginning on Tuesday at 8 am. All contestants are eligible to attend the PTDC Techni-



cian Training Fair sessions on Wednesday. Competition awards are presented at an awards event on Wednesday evening.

## PROPER ATTIRE

All contestants must wear work appropriate long pants and work shoes meeting accepted industry safety standards. Official contestant caps and T-shirts are provided during contestant orientation. Other safety-related items, such as protective eyewear, are provided by TMC on an as needed basis at each skills station. TMC SuperTech judges also have official attire that makes them easy to identify.



## SAFETY

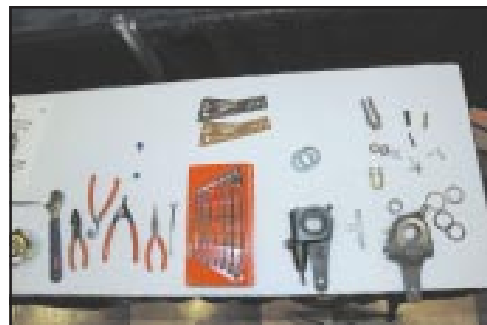
Safety glasses with side shields (provided by TMC) must be worn at all times during the Hands-on Skills Challenge. Standard shop safety procedures must be followed at all times. All spills must be cleaned up immediately. Any accident or injury must be reported to the section judge.

## CONTESTANTS WITH SPECIAL NEEDS

Every effort is made to accommodate contestants with special needs. These needs must be identified on the contest registration form prior to competition.

## TOOLS AND PARTS

All tools, manuals, and equipment are provided by competition organizers.



## SCORING

The competition is designed to measure thorough knowledge of medium- and heavy-duty commercial vehicles, including both theory and practical application.

The mandatory First-Round Written Challenge consists of a written test covering the eight competition areas. The test is based on tests prepared by the National Institute for Automotive Service Excellence (ASE). The written test score counts for 20 percent of the final competition score.

A limited number of contestants advance to the Hands-on Skills Challenge, consisting of verified State Trucking Association Grand Champions (who automatically qualify for the Hands-on Skills Challenge) plus those who scored highest in written competition.



Ties on the written test are broken by the highest score on specific categories of questions to be determined previously by the TMC SuperTech competition chairman.



Scoring on the hands-on portion of the competition is tabulated by monitors using a detailed station score sheet developed by the station technical committee. Judging scores reflect an assessment of technical skills and knowledge, accuracy, and quality of workmanship.

Scoring for each of eight individual workstations is based on 100 points and counts for 10 percent of the final competition score.

Workstation scores are transferred to a master score sheet and totaled with the written score to obtain the contestant's final score. Ties in final score are broken by the highest score in specific workstation categories as predetermined by the TMC SuperTech competition chairman.



## PRIZES

All contestants will receive an official TMC SuperTech cap, T-shirt, certificate of participation and a gift bag provided by competition sponsors.

### Grand Champion

The First Place Grand Champion receives his or her choice of a trip to the Daytona 500, NFL Super Bowl, or equivalent package, along with other valuable prizes. A special trophy, engraved with the Grand Champion's name, is provided to the individual

winner. A companion plaque is presented to the Grand Champion's company as well. The names of all Grand Champions appear on a special TMC SuperTech banner, which is displayed at all TMC general meetings.

### Second Place

The Second Place winner will receive a trophy and special prize package.

### Third Place

The Third Place winner will receive a trophy and special prize package.

### Skills Challenge Station Winners

Individuals with the highest scores at each individual Hands-on Skills Challenge station will also receive certificates of recognition.



## JUDGING GUIDELINES

Judges consist of volunteers who are recognized experts within each contest area. The number of judges required will vary, depending on the nature of the station, but one judge per station would be an absolute minimum. One judge per contestant would not be unheard of for a larger event. Each Skill Station Evaluation Sheet and Task is prepared by individual contest chairmen and each Station's committee. Point assessment for each task is specifically listed as part of each contest evaluation sheet to easily gauge contestant ability. Points are totaled by the individual contest chairman or assigned individual. The maximum score for each station is 100 points. Task values are broken down as much as possible to enable objective judging. Judging sheets are color-coded per station.

Contestant questions regarding individual issues are brought immediately to the attention of the appropriate contest chairman. Should personal/professional recognition of contestant be known by a judge, that judge is to be recused and replaced with another judge for that contestant evaluation procedure. The judge can resume normal responsibilities after that contestant has finished specific evaluation.



## SKILL STATION GUIDELINES

TMC Competition Skill Challenge Stations cover various skill areas. The actual stations will vary from year to year and state/regional/corporate contests need not hold all the stations that TMC holds each year. The number of volunteers and resources available usually will determine how many stations can be practically held.

The following is list of stations that were held during TMC SuperTech2005, and what was evaluated at each station:

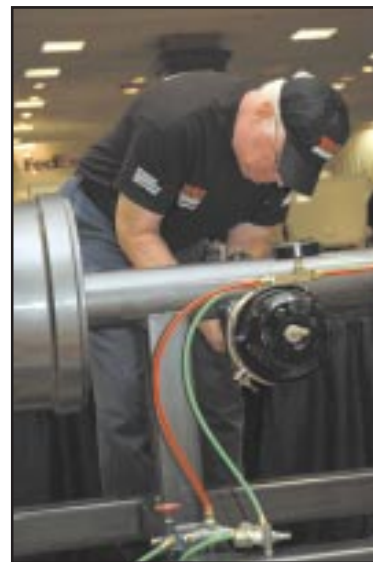
Day One—

- First Round Written Challenge: ASE-based test determines the finalists for the Hands-on Skills Challenge.

Day Two—

Hands-on Skill Challenge

- Electrical: Troubleshoot, service and repair of electrical systems including charging, lighting, and cranking systems.
- Brakes: Troubleshoot, service, and repair of brake systems.
- HVAC: Test, service and repair air conditioning and heating systems (including laws governing refrigerants), and all other components dealing with the operator's environment.



- Engine: Troubleshoot, service and repair engine induction, fuel, and exhaust systems under load and/or unloaded conditions.
- Steering: Service and repair of steering and suspension systems.
- Preventive Maintenance Inspection (PMI): Demonstrate ability to perform preventive maintenance check procedures.
- Drivetrain: Troubleshoot, service and repair drivetrain units including transmissions, clutch, carriers, torque converters and driveline.
- Service Information: Demonstrate ability to retrieve service information from current accepted industry sources.

Thirty minutes are allotted to each cycle. Orientation, instructions and task completion will occur within this time allotment. At the end of 30 minutes, with appropriate signal, contestants are escorted to next contest within rotation.

NOTE: The time allotted to each station will vary depending on the number of stations and the number of contestants. It is a good practice, however, to limit the number of contestants that can proceed from the written challenge to the hands-on challenge to ensure the competition proceeds as smoothly as possible, given the resources and volunteer support available.

Any communication between contestants and with spectators outside of the immediate Skills Station area is prohibited. Spectators are to be in a viewing area outside of the skill station. Authorized individuals may enter individual skill station for means of documenting or administration of contest activity. When idle or on break, contestants are escorted at all times by competition representatives. Once all contestants have completed the skill station challenge, contestants are held at the skill station until it is determined all scores are received and properly recorded.

### What to Expect at Each Hands-on Skills Station

The following example is a synopsis of what contestants should expect at each station during TMC's Hands-on Skills Challenge. Each challenge has been designed to test a technician's general knowledge in each functional area, without the need for expert familiarity with any particular tool, vehicle system or vehicle. Bear in mind, TMC/state/regional/corporate competitions may vary in terms of the content and



number of stations held, but these are good general guidelines to follow when establishing a set of skills stations. The following descriptions were used for TMC SuperTech2005.



- **Electrical:** Troubleshoot, service and repair of electrical systems including charging, lighting and cranking systems.  
*Specific Challenge*—Using a Fluke 88 meter, the contestant will measure and record readings and diagnosis circuits. The workstation will use A Tech training boards.
- **Brakes:** Troubleshoot, service and repair of brake systems.  
*Specific Challenge*—Given a heavy vehicle axle with S-cam brakes, the contestant will correctly perform maintenance tasks per the given instructions. No special tools will be used.
- **HVAC:** Test, service and repair air conditioning and heating systems (including laws governing refrigerants), and all other components dealing with the operator's environment.  
*Specific Challenge*—Contestants will be required to evaluate and diagnosis electrical and functional aspects of the air conditioning unit.
- **Engine:** Troubleshoot, service and repair engine induction, fuel and exhaust systems under load and/or unloaded conditions.  
*Specific Challenge*—The engine station will utilize trucks with Detroit Diesel Series 60 EGR engines. The technician must be able to navigate a computer with Detroit Diesel Diagnostic Link (DDDL) in order to complete the required repair assignment.
- **Steering:** Service and repair of steering and suspension systems.  
*Specific Challenge*—Contestant will be required to inspect measure and determine steering/suspension concerns.
- **Preventive Maintenance Inspection (PMI):** Demonstrate ability to perform preventive maintenance check procedures.  
*Specific Challenge*—Contestant will perform a PMI on a provided unit in specific areas to be revealed during the Hands-on Skills Challenge.
- **Drivetrain:** Troubleshoot, service and repair drivetrain units including transmissions, clutch, carriers, torque converters, and driveline.  
*Specific Challenge*—The contestant will be required to correctly identify each component of the inter-axle differential (IAD) and correctly assemble the IAD to reflect its proper assembly in the forward carrier. Using appropriate service reference material at the workstation, the technician will respond to questions and perform some minor assembly on subcomponents from a manual transmission and a front differential.
- **Service Information:** Demonstrate ability to retrieve service information from current accepted industry sources.  
*Specific Challenge*—The contestant will be required to answer questions using Mitchell One electronic information system.



### **AFTER THE CONTEST IS OVER. . .**

All contestants are invited to attend any of the special training sessions as part of TMC's Technician Training Fair. The awards ceremony for TMC SuperTech is held on the third day of the event. All contestants are invited to attend. TMC attempts to combine the awards ceremony with either its existing Industry Awards Luncheon Program, or if that is not practical, then the Council's group social event.



TMC does not announce individual scores of contestants, nor does it publish a list of all scores after the contest. Individual competitors may call TMC for their own scores after the event is concluded.

### **RECOMMENDATIONS FOR ESTABLISHING A STATE/REGIONAL/ CORPORATE TECHNICIAN SKILLS COMPETITION**

Many state trucking associations/maintenance councils, service/dealer operations and individual fleets have expressed strong interest in either establishing a new, or modeling an existing, technician skills competition based on the TMC SuperTech model. In this way, their champions will be best prepared to compete at the national level for the TMC event.

Establishing a technician skills competition is a challenge. TMC leveraged the work of established student competitions—such as the SkillsUSA annual event—as well as that of pioneering state trucking associations and individual fleets that had already established events on their own. The following guidelines should be useful to organizations wishing to hold their own technician skills competition:

1. Volunteer support is key to establishing a successful technician skills competition. Few organizations have the economic means to organize and execute a successful technician skills competition without the use of volunteer support. Those that do are likely to run into many problems without buy-in from their local fleets, vendors and trainers.

It is best to establish a core group of committed volunteers in an officer or oversight committee format. This committee should consist of a:

- Chairman, to oversee the entire operation.
- Vice Chairman, to support the Chairman.
- Competition Chairman, to ensure proper logistical organization of the skills stations and contest preparations, such as making sure each station has the vehicles, tools and materials needed to function.
- Rules and Judges Chairman, to establish the contest rules and ensure there are

enough volunteer judges to run the competition.

- Promotions Chairman, to focus on promoting the event to fleets, service/dealers, vendors, etc.
- Prize Chairman, to solicit and manage the prize packages for winners.
- Sponsorship Chairman, to help solicit funding for the competition food and beverage, entertainment and other expenses.
- Secretary, to keep everyone aware of what actions are taken (i.e., press).

Depending on how large the competition will be, this committee structure may need to be adjusted. For smaller events, one person may perform multiple tasks.

2. Building partnerships between all industry segments is important. Involving representatives from all industry segments is important, whether the establishing organization is a state trucking association or maintenance council, service/dealership, motor carrier or private fleet. It is a good idea to get participation from a diverse group of manufacturers and vendors, trade press, trade schools and educators as possible.
3. Offer sponsorships to suppliers and other organizations to help defray the cost of the competition. Sponsorship opportunities can cover food functions, setup costs, entertainment, etc. Typical sponsorship recognition opportunities can include: corporate logos on event banners, signage, competition apparel (T-shirts, hats), official programs, etc.
4. Hold the competition in conjunction with an existing event. Some state trucking associations hold their technician skills challenge in association with their truck driving championships. This will help mitigate much of the cost associated with holding a separate event.
5. Be sure the technician competitors are aware of the rules before the event starts. This will help solve potential problems before they can begin. Have them sign a competition agreement and release. The following is an example from TMC SuperTech2005.



## Sample Agreement and Release

In consideration of being permitted to participate in “TMC’s National Technician Skills Competition—TMC SuperTech2005” and to be eligible for awards offered, participants hereby stipulate and agree to the following:

- a. Contestant acknowledges that he or she is not in the employ of American Trucking Associations, Inc. (ATA).
- b. Both as to himself or herself and his or her heirs and personal representatives, contestant releases TMC/ATA, its directors, employees, agents and/or any of its affiliates from any and all liability and any right of action that may arise from any damage or injury which may be received while attending or participating in said

“TMC National Technician Skills Competition—TMC SuperTech2005.”

c. Contestant grants TMC/ATA and its designated agencies exclusive rights to make use of information about himself or herself, along with photographs subsequently taken under TMC/ATA's direction, in publicity and advertising activities. Contestant further agrees to make himself or herself available for publicity enterprises arranged by TMC/ATA, with newspaper/magazine/ media writers and radio and television personnel.



d. Contestant will be bound by all orders, rules and regulations governing “TMC's National Technician Skills Competition—TMC SuperTech2005” while participating in said competition.

This agreement and release was part of the Technician Contestant Registration Form which all contestants used to register for the competition. A sample is included in the SAMPLE FORMS section of this document.

6. Invite students from local high schools or vocational schools to observe the competition. This is an important outreach effort as it helps engender in the students the professionalism of our industry.
7. Invite the local media—i.e., newspapers, radio, TV, etc.— to attend and cover the event. This is an excellent opportunity to get the message out about your competition event and technician professionalism to a broader audience.
8. Invite local law enforcement and transportation department officials to attend. Better yet, invite them to participate in the event as judges or organizers.

## FOR MORE INFORMATION

For more information, please feel free to visit our website at <http://tmc.truckline.com> or call TMC offices at (703) 838-1763.



**Steve Talmadge**  
**TMC SuperTech2005**  
**Grand Champion**



*The written challenge is an important part of the overall competition for two reasons. First, it allows competition organizers to narrow the field down to a manageable size. Second, it provides an excellent means of settling tie scores during the hands-on portion of the competition.*



*Making the technician contestants feel welcome and appreciated should be an important goal. At TMC SuperTech2005, all technicians who qualified for the Hands-on Skills Challenge received a welcome package of donated gifts, along with their competition uniform.*



## PHOTO GALLERY

*Computer skills are absolutely necessary for today's vehicle technician. TMC SuperTech2005 featured a skills station (pictured right) aimed at assessing a technician's proficiency at navigating electronic service information.*



*The success of each skills station lies largely with the volunteers who plan and organize them. Whenever possible, encourage industry suppliers to sponsor a skills station through donated personnel, tools, equipment or financial resources.*



*Local fleets are an excellent source of vehicles for the Hands-on Skills Challenge portion of the competition. If room and resources permit, at least some of the skills challenge stations should feature actual vehicles to assess technician proficiency in a particular area—especially engines, heating/air conditioning and preventive maintenance inspection.*







# Technician Contestant Registration

TMC National Technician Skills Competition • Sept 19 - 20 • Valley Forge Convention Plaza • Valley Forge, PA

## REGISTRATION

Check here if you are a first time attendee.

### BY FAX:

Fax this form with credit card information to (703) 838-5978.

### BY MAIL:

Mail this form with check, money order or credit card information to ATA Meeting Registrations, PO Box 25381, Alexandria, VA 22313-5381

### ONLINE:

<http://tmc.truckline.com>

## CONTESTANT REGISTRATION FEES

Fees include competition entry, access to PTDC Technician Training Fair and all PTDC food functions/receptions. Fee also includes TMC Technician Membership for balance of 2005. NOTE: Contestants must register by Aug. 15, 2005 to compete in TMC SuperTech2005.

### CONTESTANT REGISTRATION

- TMC Technician Member FREE
- Technicians, Non-member \$75

### NON-CONTESTANT REGISTRATION

Those technicians who do not wish to register as a TMC SuperTech2005 Contestant may register separately for the PTDC Technician Training Fair according to the following registration fee schedule:

#### PTDC Technician Training Fair (Sept. 19-20)

- 1-day (TMC/ATA Member) \$50
- 1-day (Non-Member) \$75
- 2-days (TMC/ATA Member) \$95
- 2-days (Non-Member) \$140

NOTE: Non-contestants may register at anytime up to the day of the event.

#### Substituting for a TMC Member?

You must be a TMC Member to receive the TMC Member rate. Non-members from a TMC Member company, however, may substitute for a TMC Member if he or she cannot attend. To substitute for another member, please print the name of the member for whom you are substituting. Otherwise, you will be charged the non-member rate.

(Please print clearly)

#### My Company Is:

- Motor Carrier  Private Fleet  Municipal Fleet  Service/Dealer
- I am a Technician Champion from a State Trucking Association contest.

State: \_\_\_\_\_ Year: \_\_\_\_\_

I have been employed as a professional technician in the trucking industry for:

\_\_\_\_\_ years.

## REFUND POLICY

If your plans to attend the TMC meeting change, you may receive a refund—less a \$50 administration charge—up until August 30, 2005. **There will be no refunds or credits after August 30, 2005.** Written cancellations accepted by mail, fax, or email—[tmc@trucking.org](mailto:tmc@trucking.org).



If you require special assistance or dietary needs during your stay, contact both TMC and your selected hotel.

2200 Mill Road • Alexandria, VA 22314 • Phone: 703-838-1763 • <http://tmc.truckline.com>

Check here if you want this address used to update your membership record. Copy form for additional registrants.

## ATTENDEE INFORMATION

Full Name \_\_\_\_\_ Nickname for Badge \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone \_\_\_\_\_ Fax Number \_\_\_\_\_ Email \_\_\_\_\_

### AGREEMENT AND RELEASE

In consideration of my being permitted to participate in "TMC's National Technician Skills Competition—TMC SuperTech2005" and be eligible for awards offered to participants, I hereby stipulate and agree to the following:

- I acknowledge that I am not in the employ of American Trucking Associations, Inc (ATA).
- Both as to myself and my heirs and personal representatives, I release TMC/ATA, its directors, employees, agents and/or any of its affiliates from any and all liability and any right of action that may arise from any damage or injury which I may receive while attending or participating in said "TMC National Technician Skills Competition—TMC SuperTech2005."
- I grant TMC/ATA and its designated agencies exclusive rights to make use of information about myself, along with photographs subsequently taken under TMC/ATA's direction, in publicity and advertising activities. I further agree to make myself available for publicity enterprises arranged by TMC/ATA, with newspaper/magazine/ media writers and radio and television personnel.
- I will be bound by all orders, rules and regulations governing "TMC's National Technician Skills Competition—TMC SuperTech2005" while participating in said competition.

### CERTIFICATION BY CONTESTANT

I certify that I am currently employed as a commercial vehicle technician.

Signature \_\_\_\_\_ Date \_\_\_\_\_

## PAYMENT INFORMATION

I wish to register as shown in the Fees Section of this form. Payment method is checked below.

- Payment enclosed (US funds payable to American Trucking Associations, Inc.)

Charge:  VISA  MASTERCARD  AMEX THIS AMOUNT: \$ \_\_\_\_\_

Card Number \_\_\_\_\_ Expiration Date \_\_\_\_\_

Signature \_\_\_\_\_

## HOTEL HOUSING POLICY

TMC's Host Hotels **will not accept** room reservations directly from meeting attendees. Please provide credit card information on this form, as reservations can't be made without a credit card guarantee. Room confirmations will be sent to you directly from the assigned hotel upon request. All cancellations or changes to arrival/ departure dates must be made by contacting the hotel directly. If TMC's Host Hotel is full, you'll be assigned to an overflow hotel. If you have any questions, call ATA Marketplace at (800) ATA-LINE. All reservations for arrival must be accompanied by a one-night room deposit, which will be applied to the first night's stay. Any cancellations, no-shows or early departures without a 72-hour advance notice will result in the forfeiture of the one-night deposit.

### HOTEL DAILY RATES/SELECTION

Radisson Valley Forge Hotel  \$119/single  \$129/double

Valley Forge Scanticon Hotel  \$119/single  \$129/double

- Non-Smoking  No Hotel Required

### CREDIT CARD GUARANTEE

Same Credit Card # as in Section B

- Visa  Mastercard  AMEX  Other

Card #: \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature: \_\_\_\_\_

### Arrival Date

Sept \_\_\_\_\_ 05

### Departure Date

Sept \_\_\_\_\_ 05

*must be completed to be registered*

### TMC HOST HOTELS:

Radisson Valley Forge Hotel  
1160 First Ave.  
King of Prussia, PA 19406  
Phone (610) 337-2000

Valley Forge Scanticon Hotel  
1200 First Ave.  
King of Prussia, PA 19406  
Phone (610) 265-1500







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ALCOA Extrusions

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Associates Advisory Group  
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**TMC MEETINGS**

**VALLEY FORGE, PA**  
September 19-22, 2005  
2005 Fall Meeting & National  
Technician Skills Competition  
Valley Forge Convention Plaza

**TAMPA, FL**  
February 14-17, 2006  
2006 Annual Meeting & Exhibit  
Tampa Convention Center

**AUSTIN, TX**  
September 18-21, 2006  
2006 Fall Meeting & National  
Technician Skills Competition  
Renaissance Austin Hotel

# TECHNOLOGY & MAINTENANCE COUNCIL

PROVIDING TECHNOLOGY SOLUTIONS FOR THE TRUCKING INDUSTRY



September 6, 2005

Dear TMC SuperTech2005 Contestant:

The Technology & Maintenance Council (TMC) is pleased to welcome you as a contestant for the trucking industry's first-ever National Technician Skills Competition — TMC SuperTech2005. The event, which is being organized by TMC's Professional Technician Development Committee (PTDC), promises to be challenging, festive and informative. We're very glad to have you with us for this inaugural event.

Enclosed with this letter, please find a copy of the TMC SuperTech2005 regulations, along with some background about the meeting itself. Our event is being held at the Valley Forge Convention Plaza in Valley Forge, Pa., Sept. 18-20. The orientation and written exam takes place Sunday afternoon, Sept. 18, from 4 -6 pm. Plan to arrive by at least 3 pm to pick up your credentials in time for the written exam.

Our 50 finalists will be named Sunday evening at 6:30 pm during our TMC SuperTech2005 Reception. The Hands-on Skills Challenge for the 50 finalists will be held on Monday, Sept. 19 from 8 am - 4 pm. The winners will be announced during our Industry Awards Luncheon Sept 20, which will be held from 11:30 am - 1:30 pm.

All contestants are also invited to attend our TMC Technician Training Fair Monday evening and Tuesday morning. The Fair is free of charge to all contestants.

Should you have any additional questions, please feel free to call me directly at (703) 838-1776.

On behalf of TMC, good luck and see you in Valley Forge!

Sincerely,

**Robert Braswell**  
TMC Technical Director

Enclosures





# NATIONAL TECHNICIAN SKILLS COMPETITION

Sept. 19, 2005

## Monday Hands-On Skills Challenge—Contestant Rotation Schedule

ROTATION	time	PMI	Electrical/Electronics	Drivetrains	Brakes	Steering/Suspension
1st	8 - 8:30	1,2,3,4,5	6,7,8,9,10	11,12,13,14,15	16,17,18,19,20	21,22,23,24,25
2nd	8:35 -9:05	6,7,8,9,10	11,12,13,14,15	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30
3rd	9:10 -9:40	11,12,13,14,15	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30	31,32,33,34,35
4th	9:45- 10:15	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30	31,32,33,34,35	36,37,38,39,40
5th	10:20 - 10:50	21,22,23,24,25	26,27,28,29,30	31,32,33,34,35	36,37,38,39,40	41,42,43,44,45
6th	10:55- 11:25	26,27,28,29,30	31,32,33,34,35	36,37,38,39,40	41,42,43,44,45	46,47,48,49,50
7th	11:30 - 12:00	31,32,33,34,35	36,37,38,39,40	41,42,43,44,45	46,47,48,49,50	1,2,3,4,5
8th	12:45 - 1:15	36,37,38,39,40	41,42,43,44,45	46,47,48,49,50	1,2,3,4,5	6,7,8,9,10
9th	1:20 - 1:50	41,42,43,44,45	46,47,48,49,50	1,2,3,4,5	6,7,8,9,10	11,12,13,14,15
10th	1:55 - 2:25	46,47,48,49,50	1,2,3,4,5	6,7,8,9,10	11,12,13,14,15	16,17,18,19,20

ROTATION	time	Service Information	Open Rotation	HVAC	Engines	Open Rotation
1st	8 - 8:30	26,27,28,29,30	31,32,33,34,35	36,37,38,39,40	41,42,43,44,45	46,47,48,49,50
2nd	8:35 -9:05	31,32,33,34,35	36,37,38,39,40	41,42,43,44,45	46,47,48,49,50	1,2,3,4,5
3rd	9:10 -9:40	36,37,38,39,40	41,42,43,44,45	46,47,48,49,50	1,2,3,4,5	6,7,8,9,10
4th	9:45- 10:15	41,42,43,44,45	46,47,48,49,50	1,2,3,4,5	6,7,8,9,10	11,12,13,14,15
5th	10:20 - 10:50	46,47,48,49,50	1,2,3,4,5	6,7,8,9,10	11,12,13,14,15	16,17,18,19,20
6th	10:55- 11:25	1,2,3,4,5	6,7,8,9,10	11,12,13,14,15	16,17,18,19,20	21,22,23,24,25
7th	11:30 - 12:00	6,7,8,9,10	11,12,13,14,15	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30
8th	12:45 - 1:15	11,12,13,14,15	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30	31,32,33,34,35
9th	1:20 - 1:50	16,17,18,19,20	21,22,23,24,25	26,27,28,29,30	31,32,33,34,35	36,37,38,39,40
10th	1:55 - 2:25	21,22,23,24,25	26,27,28,29,30	31,32,33,34,35	36,37,38,39,40	41,42,43,44,45



# NATIONAL TECHNICIAN SKILLS COMPETITION

## S-cam Brake Station—Judges Score Sheet

Contestant # \_\_\_\_\_ Total Score \_\_\_\_\_

<b>Task 1, Haldex ASA:</b>		Allowed	Actual
1. Spring brake fully released		5 points	_____
2. Thread engagement of the push rod into the clevis per specifications.		5 points.	_____
3. Push rod/clevis lock nut installed and tightened.		5 points.	_____
4. ASA installed on camshaft, spacer washers and snap ring or e clip installed.		5 points.	_____
5. Clevis pin and retaining clips installed.		5 points.	_____
6. Haldex control arm hardware installed.		5 points.	_____
7. Cam shaft end play within specifications per axle manufacturer. {Meritor no spec} {Spicer 0.005-0.025"}		5 points.	_____
8. ASA angle to push rod within specs.		5 points.	_____
9. ASA/brake free play within specs and recorded.		5 points.	_____
10. CVSA chamber applied stroke within specs and recorded.		5 points.	_____
<b>Task 2, Meritor ASA:</b>		Allowed	Actual
1. Spring brake fully released		2.5 pts	_____
2. Correct clevis for the Meritor ASA.		2.5 pts.	_____
3. Thread engagement of the push rod into the clevis per specifications.		5 points.	_____
4. Push rod/clevis lock nut installed and tightened.		5 points.	_____
5. ASA installed on camshaft, spacer washers and snap ring or e clip installed.		5 points.	_____
6. Clevis pins and retaining clips installed.		5 points.	_____
7. Meritor pawl released during adjustment.		5 points.	_____
8. Cam shaft end play within specifications per axle manufacturer. {Meritor no spec} {Spicer 0.005-0.025"}		5 points.	_____
9. ASA angle to push rod within specs.		5 points.	_____
10. ASA/brake free play within specs and recorded.		5 points.	_____
11. CVSA chamber applied stroke within specs and recorded.		5 points.	_____

Free Stroke Measurement: \_\_\_\_\_

Chamber Applied Stroke Measurement: \_\_\_\_\_

Elapsed Time: \_\_\_\_\_ Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## HVAC Station—Judges Score Sheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_

Contestants will be told that A/C performance is poor and sometimes inoperative. Gauges will be connected but contestants will be instructed to check all gauge valves for proper position. Each item is worth 5 points.

Task	Allowed	Score
1. Verify temperature/pressure of refrigerant and/or gauge connection.	5 points	_____
2. Check belt tension and alignment.	5 points	_____
3. Set controls to proper position.	5 points	_____
4. Check all blower speeds.	5 points	_____
5. Check all air modes.	5 points	_____
6. Performance test.		
· Check for symptoms by sight. (leaks, mounting, APADs)	5 points	_____
· Check high and low pressures.	5 points	_____
· Compare to performance chart	5 points	_____
· Check temperature and air flow.	5 points	_____
· Compare to performance chart.	5 points	_____
· Check lines for hot and cold.	5 points	_____
7. Check compressor clutch. (symptoms by sound)	5 points	_____
· Check voltage.	5 points	_____
8. Verify complaint – Does A/C clutch operate properly?	5 points	_____
• Is air cold enough?	5 points	_____
9. Safety	5 points	_____
10. Troubleshooting		
· Recognize & properly test system fault.	5 points	_____
· Properly repair system fault.	5 points	_____
· Recognize & properly test electrical fault.	5 points	_____
· Properly repair electrical fault.	5 points	_____

Elapsed Time: \_\_\_\_\_

Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Electrical Station—Judges Score Sheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_ (out of 100)

- 1. Measuring voltage drops in the Starting System's control circuit. (25 pts.)**
  - Disconnect s-terminal 5 points \_\_\_\_\_
  - Draw 80 amps 5 points \_\_\_\_\_
  - Voltage drop of leg 1 5 points \_\_\_\_\_
  - Voltage drop of magnetic switch disc 5 points \_\_\_\_\_
  - Voltage drop of leg 2 5 points \_\_\_\_\_
  
- 2. Measuring the resistance of electrical components. (25 pts.)**
  - Component 1 2 points \_\_\_\_\_
  - Component 2 2 points \_\_\_\_\_
  - Component 3 2 points \_\_\_\_\_
  - Component 4 2 points \_\_\_\_\_
  - Component 5 2 points \_\_\_\_\_
  - Component 6 2 points \_\_\_\_\_
  - Component 7 2 points \_\_\_\_\_
  - Component 8 2 points \_\_\_\_\_
  - Component 9 2 points \_\_\_\_\_
  - Component 10 2 points \_\_\_\_\_
  - Component 11 2 points \_\_\_\_\_
  - Diode 2 points \_\_\_\_\_
  - Diode Scale 1 point \_\_\_\_\_
  
- 3. Determine cause of problem with a lighting circuit . (25 pts.)**
  - Volt drop measurement 2 points \_\_\_\_\_
  - Source voltage 2 points \_\_\_\_\_
  - Resistance measurement 2 points \_\_\_\_\_
  - Logical approach 2 points \_\_\_\_\_
  - High resistance ground bulb # 17 points \_\_\_\_\_
  
- 4. Measure a parasitic load. (25 pts.)**
  - Remove the battery cable 5 points \_\_\_\_\_
  - Insert the ammeter in series between the battery and removed cable 5 points \_\_\_\_\_
  - Measure and record the amp load 5 points \_\_\_\_\_
  - If the technician uses the 300m amp scale 5 points \_\_\_\_\_
  - If the technician used the fuse assembly first 5 points \_\_\_\_\_

Elapsed Time: \_\_\_\_\_

Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Service Information Station—Judges Score Sheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_ (out of 100)

**Directions:** To demonstrate your ability to retrieve service information from currently accepted industry sources, read each Heavy Truck related question carefully, then using one of the PC workstations, locate the appropriate service information, and then circle the correct answer. **Each question answered correctly is worth 10 points for a total possible of 150 points.**

**Note:** All questions shall be answered using the **Systems** button only.

1. On a Delco Remy 37MT Starter, what is the pull-in-winding voltage for a Model No. 1115595 24V solenoid?  
A) 20 Volts                      B) 5 Volts                      C) 10 Volts                      D) 7.5 Volts
2. Upon disassembly of a water pump on a Detroit Diesel 8.2L V8, what is the maximum water pump bearing bore diameter allowed before water pump body replacement is necessary?  
A) 1.3970-1.3980"              B) 1.4500-1.4510"              C) 1.4970-1.4980"              D) 1.5970-1.5980"
3. Where is the Electronic Control Module located on a Freightliner Conventional and Cabover?  
A) Under drivers seat              B) Left rear of engine  
C) Right rear of engine              D) Under center of instrument panel
4. At what interval does the manufacturer recommend adding coolant extender to a Caterpillar 3406E that is using long life coolant?  
A) 100,000 miles or every year              B) 150,000 miles or every 2 years  
C) 200,000 miles or every 2 years              D) 300,000 miles or every 3 years
5. What is the maximum brake chamber force specification for Dana Spicer ES-D-225 air disc brakes?  
A) 2125 ft. lbs. (2881 N.m)              B) 3500 ft. lbs. (4745 N.m)  
C) 3125 ft. lbs. (4237 N.m)              D) 2500 ft. lbs. (3389 N.m)
6. On a Volvo VE D12 6-cylinder engine, when installing the cylinder liners, how far above the block should the sealing surface be?  
A) 0.0080-0.0085" (0.20-0.26 mm)              B) 0.003-0.005" (0.08-0.13 mm)  
C) 0" (0 mm)                      D) 0.0059-0.0078" (0.15-0.20 mm)
7. What is the torque spec for the adjuster cap screw on a Rockwell automatic slack adjuster?  
A) 15-20 ft. lbs. (20-27 N.m)              B) 10-15 ft. lbs. (14-20 N.m)  
C) 15-20 in. lbs. (1.7-2.3 N.m)              D) 25-30 ft. lbs. (34-41 N.m)
8. What is the Rotor Coil Resistance Specification for a Leece-Neville 3625JC Series Alternator?  
A) 2.0-2.2 Ohms                      B) 3.0-3.3 Ohms                      C) 1.9-3.7 Ohms                      D) 2.9-3.7 Ohms

9. What is the rear countershaft bearing preload for the Mack T2090 manual transmission?  
A) 0.024-0.018"    B) 0.003-0.007"    C) 0.002-0.006"    D) 0.010-0.090"
10. What engine oil is recommended on a Ford 7.3L Diesel that is operated repeatedly below 32°F (0°C)?  
A) 30W    B) 5W30    C) 10W30    D) 15W40
11. To test if there is power to the Bendix 3800 Anti-Lock Brake System (ABS) module on a Navistar with air brakes, what connector and pin would you check at the ABS module?  
A) Connector C412 pin "C"    B) Connector C434 pin "J"  
C) Connector C412 pin "B"    D) Connector C443 pin "H"
12. When adjusting the valves on a Caterpillar 3406E 6-Cylinder engine, where is valve clearance measured for the intake valves? Where is valve clearance measured for the exhaust valves?  
A) Exhaust valves: between rocker arm and bridge. Intake valves: between rocker arm and bridge.  
B) Intake valves: between rocker arm and bridge. Exhaust valves: between rocker arm and valve stem.  
C) Intake valves: between rocker arm and stem. Exhaust valves: between rocker arm and valve stem.  
D) Intake valves: between rocker arm and stem. Exhaust valves: between rocker arm and bridge.
13. With a lowest possible ambient outside temperature of 30°F (-1°C), the approximate fluid capacity and recommended fluid for the Eaton-Fuller FS-8406 manual transmission is  
A) 19.5 Pts. (9.23L) of Automotive Gear Oil API MT-1 75W  
B) 18.0 Pts. (8.52L) of Heavy Duty Engine Oil MIL-L-2104 D 50  
C) 14.0 Pts. (6.6L) of Dexron III Automatic Transmission Fluid  
D) 19.5 Pts. (9.23L) of Eaton® Approved Synthetic Transmission Oil 50
14. In the event that the trinary switch on a Peterbilt HVAC system fails to shut the system off properly, situated next to the moisture indicator on the receiver-drier, rests a "Safety Switch" designed to vent pressure in excess of?  
A) 350 psi (24.6 kg/cm<sup>2</sup>)    B) 400 psi (28.1 kg/cm<sup>2</sup>)  
C) 450 psi (31.6 kg/cm<sup>2</sup>)    D) 500 psi (35.2 kg/cm<sup>2</sup>)
15. What is the torque specification of the retarder module bolts marked 6 and 9 on the Allison HD 4070 automatic transmission built after transmission serial number 6610066447?  
A) 38-45 ft. lbs. (51-61 N.m)    B) 18-21 in. lbs. (2.0-3.0 N.m)  
C) 18-21 ft. lbs. (24-29 N.m)    D) 74-88 ft. lbs. (100-120 N.m)

Elapsed Time: \_\_\_\_\_

Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Steering/Suspension Station—Judges Score Sheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_ (out of 100)

1. Driver Complaint / Condition: **Driver stated that the truck has a harsh vibration during acceleration and a minor vibration during deceleration.**

Cause / Problem:

---

---

Correction:

---

---

2. Driver Complaint / Condition: **Driver stated that the vehicle has a rough ride and is excessively bouncy, after driving over a bump. Inspect the vehicle and determine the cause.**

Cause / Problem:

---

---

Correction:

---

---



3. Driver Complaint / Condition: **Driver stated that steering wheel turns further in one direction than the other. Inspect the vehicle and determine the cause.**

Cause / Problem:

---

---

Correction:

---

---

4. Driver Complaint / Condition: **Driver complains that truck pulls to the right and the steering wheel shakes excessively. Perform the correct tie rod end procedure, with the tools provided and determine if the tie rod end is the cause.**

Cause / Problem:

---

---

Correction:

---

---

Elapsed Time: \_\_\_\_\_

Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Drivetrain #1 Station—Judges Score Sheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_ (out of 100)

Using the Service Manual provided at this station, complete the following task and questions.  
(Circle the correct answer on questions 2 thru 6)

1) Completely assemble the RTLO-16718 Shift Bar Housing. \_\_\_\_\_

(Circle the correct answer on questions 2 thru 6)

2) In the following nomenclature, what does the '9' represent? \_\_\_\_\_

'RTLO-20913A'

- A. Design Level – Improved Seal System
- B. Ratio Set
- C. Number of Forward Speeds
- D. Nominal Torque Capacity

3) What is the correct torque value for the shift yoke lockscrews? \_\_\_\_\_

- A. 20-25 lb/ft
- B. 8-12 lb/ft
- C. 35-45 lb/ft
- D. 18-22 lb/ft

4) The filter/regulator assembly regulates the air pressure to: \_\_\_\_\_

- A. 38-43 PSI
- B. 58-63 PSI
- C. 48-53 PSI
- D. 68-73 PSI

5) Once the shift bar housing is installed on the main case, the capscrews should be torqued to the following value: \_\_\_\_\_

25-35 lb/ft

- A. 35-45 lb/ft
- B. 45-55 lb/ft
- C. 55-65 lb/ft

6) Referring to the power flow section, how many gearsets are being used in 3<sup>rd</sup> gear in a 13-speed? (Note: One gearset equals three mating gears) \_\_\_\_\_

- D. None – Straight through The Box
- E. 2
- F. 3
- G. 4

Elapsed Time: \_\_\_\_\_

Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Drivetrain #2 Station—Judges Score Sheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_ (out of 100)

### Drive Axle Station

#### IAD Component Identification, assembly and operation scoring sheet.

- Using the inter-axle differential assembly from a forward carrier, identify each component of the inter-axle differential. Write in your answers below:

Item A \_\_\_\_\_.

Item B \_\_\_\_\_.

Item C \_\_\_\_\_.

Item D \_\_\_\_\_.

Item E \_\_\_\_\_.

- Assemble the components onto the IAD stand.

- Using the inter-axle differential assembly from a forward carrier, trace the power flow through the assembly. Conditions are; normal driving conditions, IAD unlocked. Start with the first component receiving torque and finish with the last component delivering torque. Write in your answers below:

1<sup>st</sup> component- \_\_\_\_\_.

2<sup>nd</sup> component- \_\_\_\_\_.

3<sup>rd</sup> component- \_\_\_\_\_.

4<sup>th</sup> component- \_\_\_\_\_.

- Using the inter-axle differential assembly from a forward carrier, which two components are delivering torque equally? Write in your answers below:

1. \_\_\_\_\_.

2. \_\_\_\_\_.

- Using the inter-axle differential assembly from a forward carrier, answer the following questions.

- Which one component drives the rear drive axle?

\_\_\_\_\_.

- Which one component drives the forward drive axle?

\_\_\_\_\_.

- Using the illustrations on the following page, identify whether or not differential action taking place in each of the three differentials. Complete the blanks with one of the following 2 choices. The first one is completed for you. NOTE: The spinning wheels are spinning at the same speed.

1. Action

2. No action

Elapsed Time: \_\_\_\_\_

Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## PMI Station—Judges Score Sheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_ (out of 100)

	<b>In Cab Inspection</b>	Value	Yes	No	Contestant Readings	Score
1	Clutch Free Play	2				
2	City Horn	2				
3	Windshield Washers	2				
4	Seat Belt Buckle loose	2				
5	Fire Extinguisher Mount	2				
6	Dome Light Inoperative	2				
7	Trailer brake handle loose	2				
8	Checked DVIR book	3				
9	Passenger side mirror haze?	2				
	<b>Total assigned points</b>	<b>19</b>				
	<b>DOT Air Brake Inspection</b>					
1	Air System Drained	3				
2	Pressure at which light and buzzer go off	3				
3	Air Compressor Build Time	3				
4	Cut out pressure of the air governor	3				
5	Cut in pressure of the air governor	3				
6	Drain primary tank-secondary loss?	3				
7	Drain secondary tank-primary loss?	3				
8	System air leaks?	3				
9	System leak check	3				
	<b>Total assigned points</b>	<b>27</b>				
	<b>Engine Compartment Inspection</b>					
1	Loose AC belt	2				
2	Intake manifold bolts missing	2				
3	Oil leak right side of the engine	2				
4	Fluid level-power steering	2			LEVEL	
5	Fluid level-oil level	2			LEVEL	
6	Fluid level-antifreeze	2			LEVEL	
7	Coolant protection level checked	3				
8	Coolant protection level	2			LEVEL	
9	Refractometer used?	2				
10	Cricket gauge used?	2				
11	What was the belt tension?	2				
	<b>Total assigned points</b>	<b>23</b>				

(Continued on reverse)

(Continued from front page)

## PMI Station—Judges Score Sheet

	Value	Yes	No	Contestant Readings	Score
<b>Tires and Wheels Inspection</b>					
1	Check pressures using gauge?	2			
2	Tread depths at three points,etc?	2			
3	Found loose lug nuts?	3			
4	Checked rims for cracks,etc?	2			
	<b>Total assigned points</b>	<b>9</b>			
<b>Wheel Bearing and Kingpin Inspection</b>					
1	Wheel bearing endplay	2			
2	Dial indicator for kingpin check	2			
3	Jackstand under axle	3			
	<b>Total assigned points</b>	<b>7</b>			
<b>Brake Components Inspection</b>					
1	Checked drums, lining thickness?	2			
2	Checked brake rod stroke	2			
	<b>Total assigned points</b>	<b>4</b>			
<b>Steering Column/Gearbox Suspension and Steering Linkage Inspection</b>					
1	Did tech state lube as needed?	2			
2	Play in the steering gearbox?	2			
3	Draglink tie rods inspected?	2			
4	Suspension, springs,shocks,etc. checked?	2			
	<b>Total assigned points</b>	<b>8</b>			
<b>End of PMI Update Paperwork</b>					
1	Told judge need to fill out RO, etc?	3			
	<b>Total assigned points</b>	<b>3</b>			
	Workstation Assigned Points	100			
	Bonus Points				
	Total workstation Score				

Elapsed Time: \_\_\_\_\_

Judge: \_\_\_\_\_



# NATIONAL TECHNICIAN SKILLS COMPETITION

## PMI Station—Judges Instructions

All safety precautions are to be observed during the assigned task- The vehicles **will not start** and all contestants must be informed that the areas where the vehicle would be running under normal testing will be VERBAL only, I.E. contestant will verbally explain inspection procedures.

- Wheels chocked
- Safety glasses
- Gloves where appropriate
- Ear protection where appropriate
- Jack stands in place

If the proper safety precautions are not used, stop the task until the problem is identified and corrected. The contestant will have one chance to correct any safety infraction. If the problem is not corrected, then stop the contestant from proceeding with the task.

At the PMI workstation the contestant will be provided a vehicle and all tools, etc. to complete the required inspections. Contestant will perform the following inspections on the unit.

### **SCORING**

Each skills test section will be scored as noted. Potential assigned task points will be 100 points.

Individuals completing all of the assigned tasks and scoring 100 will receive 10 additional bonus points.

### **WORKSTATION TOOLS**

Bottle jack

Jack stand

Dial indicator and magnetic base

Cricket gauge

Refractometer

Required hand tools

Disposable Shop towels

Antifreeze gauge

## A. IN CAB INSPECTION

The contestant will inspect the DVIR book and inspect for defects on the systems inside the cab. Explain to the judge what was found defective and why it is defective.

The judge will document all the following on the answer sheet:

- did the technician find all the bugs planted
- were the explanations correct
- did the technician do a thorough inspection

Induced defects in the cab are:

1. No free-play in clutch pedal (2 points)
2. City horn inoperative (2 points)
3. Windshield washers inoperative (2 points)
4. Seatbelt buckle assembly loose on drivers seat (2 points)
5. Fire extinguisher not mounted to unit (2 points)
6. Dome light inoperative (2 points)
7. Trailer brake valve handle loose (2 points)
8. Checked DVIR book for prior and current write ups, sign off (3 points)
9. Passenger side mirror hazy (2 points)

## B. D.O.T. AIR BRAKE SYSTEM EVALUATION

**WARNING: DO NOT START VEHICLE**

While in the cab, the contestant will explain how to perform a brake system evaluation. Steps taken during the evaluation will be explained to the judge. The judge will determine if the responses given are accurate and if proper sequence of the test was followed.

1. Drain system; observe that the low air-warning buzzer and light are on; allow air pressure to build, (3 points)
2. As the air pressure builds when does the light and buzzer go off? (60-75psi). (3 points)
3. Observe the air compressor build up time. (System should build air from 80-100psi in less than 40 seconds) (3 points)
4. Observe the cutout pressure of the air governor. (Cutoff between 120-135psi) (3 points)
5. Bleed off air and observe governor cut in pressure. (Should be 20 psi between cut in and cut out pressure) (3 points)
6. Check air tank check valves unit at max pressure drain primary tank. Does the secondary tank lose pressure? (Should not loose any) (3 points)

7. Build air and repeat steps, drain secondary tank. Does primary tank loose pressure? (Should not loose any) (3 points)
8. Build air to max in unit, shut off unit and check for air leaks. (No more than 4 psi in two minutes.) (3 points)
9. Release parking brake then apply foot valve, let system stabilize and check for leaks. (No more than 6 psi in two minutes) (3 points)

### **C. ENGINE COMPARTMENT INSPECTION**

The contestant will inspect the engine and other components for defects, inspect for leaks, proper fluid levels and protection levels. Contestant will explain to the judge what was found and why it failed or passed the inspection.

The judge will determine if the induced defects in the engine compartment were detected.

1. Were all bugs found in engine compartment?
  - Loose a/c belt (2 points)
  - Bolts missing in intake manifold (2 points)
  - Oil leak on right side of engine (2 points)
2. Were all fluid levels checked?
  - Power steering level (2 points)
  - Oil level(2 points)
  - Anti freeze level(2 points)
3. Was the protection level checked? (3 points)
  - What was the coolant protection level? (2 points)
  - Did the tech use a refractometer to check the coolant protection level? (2 points)
4. Did technician use cricket gauge to check belt tension? (2 points)
  - What was the belt tension? (2 points)

### **D. TIRES AND WHEELS INSPECTION**

The contestant will inspect the Tire and Wheel assembly's and explain to the judge the proper steps and results of the inspection.

1. Did the technician check pressures using air gage? (2 points)
2. Did the technician check tread depths at three points around the tire with proper gage while looking for matching size, tread patterns, cuts, debris, etc? (2 points)
3. Did the Technician find the loose lug nut/nuts? (3 points)
4. Did the Technician look for cracks or defects in rim assembly? (2 points)



## **E. WHEEL BEARING AND KINGPIN INSPECTION**

The contestant will inspect the front end of the unit and inspect king pin for wear and proper wheel bearing endplay. The contestant will explain to the judge what steps he is taking and the results of his inspection to the judge.

The judge will determine if the contestant accurately performed the inspection.

1. Did the technician get the proper endplay readings?  
(Should be .001-.005") (2 points)
2. Did the technician use dial indicator for measuring king pin wear?  
(2 points)
3. Did the technician use proper safety procedures (jack stands)? (3 points)

## **F. BRAKE COMPONENTS INSPECTION**

Contestant will inspect brake components and explain results to the Judge.

1. Did the technician check the drums, hoses and brake lining thickness? (2 points)
2. Did the technician check brake rod stroke? (2 points)

## **G. STEERING COLUMN/GEAR BOX, SUSPENSION AND STEERING LINKAGE INSPECTION**

The contestant will inspect the steering column including the gearbox, all linkage and suspension components, explain to the judge proper steps taken and results of the inspection. The judge will determine if the technician performed the inspection correctly:

1. Did the tech state lubricate suspension/steering as needed? (2 points)
2. Was there play in the steering gearbox? (2 points)
3. Was the draglink/tie rod components inspected? (2 points)
4. Was the suspension, springs, shocks, shackles and mounts checked? (2 points)

## **H. END OF PM INSPECTION**

At this point the contestant would fill out the repair order and update any necessary paperwork and explain to the Judge why it's important.

- 1- Told judge the need to fill out repair order and update paperwork?  
(3 points)

###



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Brakes Station—Information Sheet

**Necessary equipment: (items 13-15 to be provided by PTDC, items 16a-e to be provided by Snap-On Tools)**

### A. Station

1. 5- Trailer axles with brakes on training stand, 3 from Meritor and 2 from Spicer.
  - a. 16.5 x 7 brake
  - b. Camshaft = 28 spline and 1.5" dia.
  - c. 30/30 long stroke chambers
2. 75- Contestant Instructions and Skills Tests
3. 6 - Meritor Trailer Axle Maintenance Manuals (MM 14)
4. 6 - BSFB Cam Brake Maintenance Manuals {BW7258}
5. 6 - Haldex ASA Maintenance Manuals {L30033HBS of BW7257}
6. 6- Meritor ASA templates of each color for a total of 30 (Tan, brown, yellow, green, and white)
7. 6- Meritor automatic slack adjusters; 28 spline, 1.5" dia., 5.5" length.
8. 6- Haldex automatic slack adjusters; 28 spline, 1.5" dia., 5.5" length.
9. 6-Single hole clevises; 5/8" x 18 thread.
10. 6-Dual hole clevises; 5/8" x 18 thread.
11. Assortment of camshaft selective washers, snap rings and E-clips.
12. Assortment of clevis pin retainers, both small and large.
13. 7- 6' or 8' group meeting table
14. 10- chairs
15. 120 psi air drop
16. Hand tools; one (1) for each axle, 5 total
  - a. Combination wrench set to include 5/16, 7/16,  $\Omega$ , 9/16.
  - b. Standard, needle nose and side cutter pliers
  - c. Snap ring pliers set
  - d. Soap stone marker
  - e. Rule/tape measure

### B. Contestant

## Brakes Station—Information Sheet (continued)

- a. Safety glasses and shoes
- b. Pencils

### Station starting condition:

1. Each trailer axle will be set up as follows:
  - a. 16.5 x 7 inch brake, including all hardware and camshaft installed.
  - b. Cast brake drum installed.
  - c. Long stroke 30/30 air chamber installed.
  - d. ASA, spacer washers, and snap ring or e clip removed.
  - e. ASA clevis and push rod/clevis lock nut removed.
  - f. Haldex control arm bracket removed.
  
2. Each work bench will be set up as follows:
  - a. 1 of each: Meritor ASA, Haldex ASA (AA1 or S ABA),
  - b. 1 single hole ASA clevis and 1 double hole clevis.
  - c. Clevis pins and retainers.
  - d. Push rod/clevis lock nut.
  - e. Meritor ASA templates.
  - f. Haldex bracket kit.
  - g. Meritor, Haldex installation manuals.
  - h. Shop towels.
  - i. Hand tools.
  - j. Tape measure
  - k. Soap stone marker
  - l. Contestant instructions and score sheet.



# NATIONAL TECHNICIAN SKILLS COMPETITION

## PMI Station—Information Sheet

### **PMI Workstation Objectives**

During the PMI workstation task, proper safety precautions should be observed. Improper safety procedures will count against an individual. Contestant will perform the following inspections on the unit:

### **In cab inspection:**

Contestant will inspect the DVIR book for write ups and proper sign off and for defects on the systems inside the cab and explain to the judge what was found defective and why it is defective.

### **D.O.T. air brake system evaluation: Contestant will not start vehicle.**

While in the cab, contestant will explain the proper steps on how to perform a D.O.T. air brake system evaluation. Steps taken during the evaluation will be explained to the judge.

### **Engine compartment inspection:**

Contestant will inspect the engine and other components for defects. Inspect for leaks, proper fluid levels and protection levels. Explain to the judge what was found and why it failed or passed inspection.

### **Tires and wheels inspection:**

Contestant will inspect the Tire and Wheel assembly's and explain to the judge the proper steps and results of the inspection.

### **Wheel bearing and kingpin inspection:**

Contestant will inspect the king pin for wear and for proper bearing endplay. The contestant will explain the steps taken and the results to the judge.

### **Brake component inspection**

Contestant will inspect brake components and explain results to the Judge.

### **Steering column/gear box, suspension and steering linkage inspection:**

Contestant will inspect the steering column including the gearbox, all linkage and suspension components. Explain to the judge proper steps taken and results of the inspection.

### **End of PM inspection**

At this point contestant would fill out the repair order, update any necessary paperwork and explain to the Judge why it's important.



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Drivetrain (Drive Axle) Station—Information Sheet

### Necessary equipment: (items 6-8 to be provided by PTDC)

#### A. Station

1. 6- sets of inter-axle differential components
  - a. Input shaft, IAD assembly, forward side gear, rear side gear, clutch collar.
2. 75- Contestant Instructions and Skills Tests
3. 6- Rear Drive Axle Maintenance Manuals
4. 6- Rear Drive Axle Parts Books
5. 6- IAD training stands
6. 6- work benches
7. 1- group meeting table (chairman's table)
8. 10- chairs

#### B. Contestant

- a. Safety glasses
- b. Safety shoes
- c. Pencils

### Station starting condition:

1. Each work bench will be set up as follows:
  - a. 5 inter-axle differential components (disassembled).
  - b. Training stand.
  - c. Contestant instructions and skills test.
  - d. Meritor parts book. (PB-9147)
  - e. Meritor maintenance manual (MM 5L).

### Judge responsibilities:

1. Remain sitting at each station during the test.
2. Be available to answer questions from the contestant.
3. Questions will be answered only if they relate to station procedures and not to specific details of a test question or task.
4. Arrange tools and manuals in a predetermined order prior to each new contestant entering the station for consistency.
5. Score contestant tests on the **Judges Score Sheet** after completion and return to the station chairman throughout the day.
6. Do not do anything that may distract the contestant during their test.
7. Do not physically assist the contestant during the skills test.
8. If you need help or have questions, ask the station chairman.
9. At the end of the 30 minute skills test, collect the skills test from the contestant and direct that contestant to the chairman's table.



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Drivetrain (Drive Axle) Station—Information Sheet

### Contestant instructions

1. You will have 30 minutes to complete the stated objectives below. There will be an audible announcement given at the 15-minute mark and at the 28 minute mark.
2. If you complete the objectives prior to the expiration of time, remain at the station.
3. Once the total station time has expired, return to the main table and be seated.
4. No conversing with other contestants.
5. If you have questions, ask the station judge.
6. Questions will be answered by the judge only if they relate to skills procedures and not to specific details of a test question or task.

### Station objectives:

- A. The contestant will be required to correctly identify each component of the inter-axle differential. The contestant will provide the station judge with written response on the skills test sheet.
- B. The contestant will be required to correctly assemble the IAD to reflect its proper assembly in the forward carrier. The contestant will signal the station judge after assembly; the judge will then visually determine accuracy of the assembly.
- C. The contestant will be required to correctly describe in writing the power flow through the IAD assembly. The contestant will provide the station judge with written response on the skills test.
- D. The contestant will be required to identify whether or not differential action is taking place in each of the three differentials of a tandem axle set when provided with different wheel spin scenarios.



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Electrical Station—Information Sheet

**Main concept of this skill station: (*What must the technician know?*)**

- Operation #1**      *Starting system control circuit operation and testing, DVOM usage, carbon pile & IC-2.*
- Operation #2**      *Electrical resistance measurement, DVOM (ohmmeter) usage*
- Operation #3**      *Lighting Circuit Operation and testing, DVOM usage*
- Operation #4**      *Measurement Parasitic Load, DVOM (ammeter) usage*

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**Describe the skill station: (*What will the technician do?*):**

- Operation #1 25 points**      *Measuring voltage drops in the Starting System's control circuit.*
- Operation #2 25 points**      *Measuring the resistance of electrical components.*
- Operation #3 25 points**      *Determine cause of problem with a lighting circuit*
- Operation #4 25 points**      *Measure a parasitic load.*

You will be awarded up to 100 **points** based on your workmanship and professionalism.

Competitor number \_\_\_\_\_ Skill Station number \_\_\_\_\_

### Electrical Testing and Diagnosis

#### Skill Preparation Sheet

#### Necessary Equipment:

- Tools:**
- 5 DVOM
  - 5 AMP probes
  - 5 ATech 1800 Trainers
  - 6 Computers with ATech Software
  - 5 Sets of electrical component boards
  - 5 Starting systems on boards with problems inserted
  - 5 Carbon Pile Load testers
  - 5 Intelli-Check-2 testers
  - 5 Fuse assemblies
  - 5 Test lights

**Supplies:** Replacement wire and components for ATech Trainers, wire strippers and cutters, extra relays, Starter boards, component board and battery.

#### Additional operations, comments, safety concerns, specific instructions, etc.:

- Competitors will wear safety glasses while working in the test station at all times.
- Scoring criteria is included on the score sheet award points only as directed.
- Judges must become familiar with the workstation instruction sheet, work sheet, score sheet and the reference materials.
- Judges must watch the competitor closely to check DVOM readings and values are recorded for each reading.



# NATIONAL TECHNICIAN SKILLS COMPETITION

## Brakes Station—Worksheet

### Contestant instructions

1. You will have 30 minutes to complete the stated objectives below. There will be an audible announcement given at the 15-minute mark and at the 28 minute mark.
2. If you complete the objectives prior to the expiration of time, remain at the station.
3. Once the total station time has expired, return to the main table and be seated.
4. No conversing with other contestants.
5. If you have questions, ask the station judge.
6. Questions will be answered by the judge only if they relate to skills procedures and not to specific details of a test question or task.

#### **Station objectives:**

Given the choice of 2 automatic slack adjusters (Meritor and Haldex) the contestant will correctly install and set up the two ASA's.

Correct installation will be judged per the manufacturer's procedures, TMC Recommended Practices, and/or the Commercial Vehicle Safety Alliance procedures.

The contestant will install and set up the first chosen ASA, adjust the brake, check and record free stroke, and conduct a CVSA chamber applied stroke check and record the stroke in inches on the score sheet. When complete the contestant will call for the judge to score the first task.

The contestant will install the second ASA, adjust the brake, check and record free stroke, and conduct a CVSA chamber applied stroke check and record the stroke in inches on the score sheet. When completed with the second ASA the judge will again be called over to score the second task.

Once scoring is complete on both tasks, the contestant will remove the ASA's and related components and place them on the work table.





# NATIONAL TECHNICIAN SKILLS COMPETITION

## Electrical Station—Contestant Worksheet

Contestant # \_\_\_\_\_

Total Score \_\_\_\_\_ (out of 100)

Operation #1: Measuring voltage drops in the *Starting System's control circuit*.

The problem the driver of this vehicle has been reporting is the starter does not always engage when he attempts to start the vehicle. Please perform a voltage drop test on the control circuit. Record the voltage drop of all three parts of this circuit.

Leg 1..... \_\_\_\_\_

Magnetic switch contact..... \_\_\_\_\_

Leg 2..... \_\_\_\_\_

Note: You may refer to TMC's RP-129

Operation #2: *Measuring the resistance of electrical components.*  
Record the values

Please measure and record the resistance value of each of the eleven items on this board. Test leads should be connected to each side (on the solder). You must write the exact value you record to receive full credit. This means you must include all zeros.

One on the items is a diode. Please identify the location of the diode.

Item 1 \_\_\_\_\_

Item 2 \_\_\_\_\_

Item 3 \_\_\_\_\_

Item 4 \_\_\_\_\_

Item 5 \_\_\_\_\_

Item 6 \_\_\_\_\_

Item 7 \_\_\_\_\_

Item 8 \_\_\_\_\_

Item 9 \_\_\_\_\_

Item 10 \_\_\_\_\_

Item 11 \_\_\_\_\_

# Electrical Station—Contestant Worksheet (continued)

Operation #3: *Determine cause of problem with a lighting circuit.*  
Record your findings of your tests

Location of fault  
Component number \_\_\_\_\_

Type of fault \_\_\_\_\_

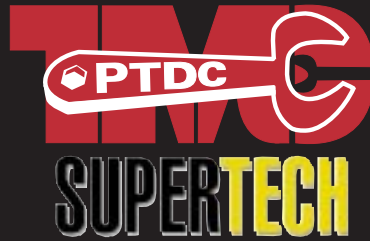
Operation #4: *Measure a parasitic load.*

The starter board has a parasitic load (load that is constantly drawing current) that is drawing current out of the battery. Please use the appropriate tool to determine the exact amount of parasitic load. Please ensure you do not exceed the capacity of the meter.

Load \_\_\_\_\_

###





**Technology & Maintenance Council**  
American Trucking Associations, Inc.

2200 Mill Road  
Alexandria, Va. 22314  
(703) 838-1763  
(703) 684-4328 FAX  
<http://tmc.truckline.com>