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**NASA Time Trial (NASA TT)**

**Official 2017 National Rules**

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## NASA Time Trial (NASA TT)

Official 2017 National Rules

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### 1 Definitions and Claims

NASA Time Trial (NASA TT) is an automobile road course competition series focused on time trial style competition, and shall function as an advertising and marketing tool for the series sponsors, the independent sponsors of each team, as well as the official sanctioning body of the series. The trade name, “NASA Time Trial (NASA TT)” and these rules are the property of the National Auto Sport Association, Incorporated ®; located at P.O. Box 2366, Napa Valley, CA 94558; 510-232-NASA (6272).

### 2 Sanctioning Body

The NASA TT series is sanctioned by the National Auto Sport Association (NASA). All events are governed by these rules, applicable addendums, prima facie rules, as well as those found in the latest version of the NASA *Club Codes and Regulations* © (CCR). All decisions made by the NASA TT Administration are final, except under certain conditions, as specified under Section 15 Protests.

### 3 Intent

The intent of these rules is to provide mandates to ensure that all vehicles are modified within clearly established limits, to strive for an even platform, in which a contest of driving skill may provide the most talented drivers with great rewards. These rules provide the NASA TT Administration a guideline to use when making decisions regarding NASA TT. The intent of the rules and safety considerations will be the overriding factors in making such decisions, as opposed to a constrained interpretation of the rules based on phraseology or verbiage. The rules shall be applied in a logical manner that seeks to provide competitors a safe and fair venue for competition.

If a performance modification is not specifically allowed by the rules, it is prohibited. A permitted item cannot be modified to perform either a prohibited function, or the function of an item that would otherwise be assessed points under the modification rules. Vehicle legality is the sole responsibility of the driver. NASA TT Officials will attempt to use less invasive techniques for monitoring TT rules compliance than is expected in NASA race classes. As such, penalties for non-compliance with the rules will be harsh, and may include disqualification and expulsion from further NASA TT competition with a single infraction, regardless of the nature of the infraction. Competitors are encouraged to seek clarification of any rule and/or inspection of any modified or non-BTM (Base Trim Model) part they are unsure about, before competition, from their Regional TT Director or the National TT Director.

## 4 **Purpose**

NASA TT provides a venue for spirited on-track competition with a high degree of both safety and convenience. NASA TT allows qualified individuals to compete in a "best lap time" format in a prepared car in advanced level open-passing sessions, and bridges the gap between NASA HPDE 4 and wheel-to-wheel racing.

## 5 **Driver Requirements/Licensing**

The Regional TT Director must approve all drivers before they may compete. The minimum requirements for getting approval include:

- 1) Successfully completing a NASA HPDE 4 event, or current NASA Competition or Provisional Race License, or current Competition Race or TT license with various other organizations at the discretion of the TT Director, or an extensive verifiable driver history of open passing road course events or competitions with other reputable organizations (may include former racers without a current competition license, etc.) at the discretion of the TT Director and run group leader.
- 2) Exhibiting knowledge of the NASA TT rules, and understanding of the consequences of non-compliance.
- 3) Exhibiting understanding of the nature of NASA TT including the spirit of cooperation that is required between drivers on the track, and the high standard of driving performance and safety that is expected.
- 4) Exhibiting knowledge of the technical and safety inspection process.

After filling out the NASA TT license application and getting the signed approval of the Regional TT Director, a driver may begin TT competition. After the driver completes one event day of TT competition, the Regional TT Director may (at his discretion) approve the application for a National NASA TT license, require an additional event day for evaluation, or deny the application and counsel the driver on what is needed to become successful at the next attempt. The approved driver must then e-mail or fax in the approved, signed application and credit card information for a \$10 processing fee to NASA at least two weeks before the next event. The NASA TT license is valid for use in any NASA region, and at the NASA Championship [events](#). It is valid for up to one year, and will expire at the end of the calendar year of competition. Renewal (on-line) will only be an administrative formality provided that the driver competed in at least two event days during the season. Renewal for drivers not competing in at least two days may require repeating the initial application process as described above.

Drivers that possess a current NASA Competition or Provisional Race License will not be required to also get a NASA TT License. However, over-aggressive driving in a TT/HPDE4 run session may put their Competition Race License in jeopardy.

A NASA TT license can be revoked for a variety of reasons, some of which include: giving false information on the application, failure to comply with the rules, unsafe driving, high incident count (spins/offes), car contact (with objects or other vehicles), and unsportsmanlike conduct on or off the track. Licensed racers participating in NASA TT that commit any of the above infractions may be subject to suspension or permanent ejection from NASA TT competition, as well as revocation of their NASA Competition Race license.

## 6 The Classes

There are a total of nine NASA TT competition classes. Eight are combined production and non-production racecar classes and one is an unlimited class. The classes are: TTU (unlimited); TT1, TT2, TT3, **TT4** (based on Adjusted Wt/HP Ratio); and TTC, TTD, TTE, TTF (based on Base classing and Modification Points). In addition, there are two classes (G & H) that are listed for purposes of base classing only (**TTC-TTF** competition vehicles only). There will be no competition in either TTG or TTH.

The classing rules for TT vehicles mirror those for the Super Touring/Super Unlimited and Performance Touring race cars. So, any car legal for a ST/SU or PT race class will also be legal in the corresponding TT class. The classes “map” to each other as follows:

TTU = Super Unlimited	<b>TT4 = ST4</b>	TTF = PTF
TT1= ST1	TTC = PTC	
TT2= ST2	TTD = PTD	
TT3= ST3	TTE = PTE	

The classing rules for TTU, TT1, TT2, TT3, and **TT4** are listed in Section 7.

The classing rules for TTC, TTD, TTE, and TTF are listed in Section 8.

Any four-wheel, fendered/closed-wheel vehicle that passes safety technical inspection that is not eligible to compete in **TTC-TTF** due to the more restrictive classing rules, will be eligible to compete in either TTU or TT1, TT2, TT3, or **TT4** depending on the results of chassis dynamometer (Dyno) testing, and the resulting “Adjusted Weight/Power (Wt/HP) Ratio”. The “Adjusted Wt/HP Ratio” is a calculation based on a simple Wt./HP ratio that is adjusted based upon “Modification Factors” listed in Section 7.

## 7 TTU, TT1, TT2, TT3, TT4 Classing

### 7.1 Class Eligibility

Any four-wheel vehicle that passes NASA safety technical inspection can be used to compete in TTU (Time Trial Unlimited). **Note that open wheel formula cars are not permitted, and all vehicles must be closed-wheel and/or have fenders.** There are no maximum power limits or minimum weight limits. Any type and size tires may be used. All types of transmissions, chassis, frames, bodies, suspensions, aerodynamic modifications, and braking systems are permitted.

For TT1, TT2, TT3, and **TT4**, “Production” vehicle models are those manufactured by an automobile manufacturer (**at least 300 produced per year**) and approved for street use by the U.S. D.O.T., T.U.V, or Japanese government.

Sports racers, “Prototypes”, and monocoque chassis purpose-built race cars are permitted in TT1 and TT2 using the specific Modification Factor listed for these chassis in 7.4.2. They are not permitted in TT3 or TT4 unless specifically approved elsewhere in these rules, or by written approval of the National TT Director.

For TT1, TT2, and TT3, all other vehicles (except for sports racers, “prototypes”, and monocoque purpose-built racers), including “kit” cars, purpose-built track/race cars, and tube-frame vehicles are considered “Non-Production” vehicles, and will be assessed the “Non-Production Vehicle” Modification Factor listed in 7.4.2 unless the vehicle model is listed in Section 7.5 of these rules, and has been approved to compete under “Production” vehicle status. Alternately, a competitor with a vehicle originally qualified as a “Production” model may use the Modification Factor assessment for “Non-Production Vehicle” to avoid all “Production vehicle only” limitations/restrictions.

For TT4, all vehicles must originate as Production street vehicles unless listed otherwise in Section 7.5. Tube frame chassis conversions are not permitted. The Non-Production Vehicle Modification Factor may not be utilized in TT4, but additional specific Modification Factor assessments for certain non-production modifications are listed in 7.4.2.

**All vehicles must comply with all NASA safety requirements in the CCR (see 7.2 exceptions), and all of the restrictions and limitations listed below in 7.2 and 7.3 to be eligible to compete. All competition is based on the “Adjusted Weight/Power Ratios” (section 7.4) below:**

**Time Trial 1 (TT1)** = “Adjusted Wt/HP Ratio” equal to, or greater than, **6.00:1**

**Time Trial 2 (TT2)** = “Adjusted Wt/HP Ratio” equal to, or greater than, **8.00:1**

**Time Trial 3 (TT3)** = “Adjusted Wt/HP Ratio” equal to, or greater than, **10.00:1**

**Time Trial 4 (TT4)** = “Adjusted Wt/HP Ratio” equal to, or greater than, **12.00:1**

The National TT Director will determine and publish any additional Modification Factor(s), specific limitations, and/or restrictions placed on specific vehicle models. **Unless listed, performance enhancing modifications are otherwise unlimited.**

## 7.2 NASA CCR Section 11, 15 and 18 Exceptions

All of the rules listed in the NASA CCR Section 11 and 18 will apply, except, the following rules will supersede those in the CCR:

CCR 15.6—Roll cages may be built to provide an unlimited amount of chassis stiffening.

Any number of cage mounting points may be used above the six (6) minimum requirement, and, any number of additional tubes may be used above the minimum with additional attachment points to the body, including tubes that penetrate the firewall.

CCR 15.8—An electrical master cut-off switch is recommended.

CCR 15.9—Steering wheel lock removal is highly recommended, but not required.

CCR 18.3—Any type of fuel or additives that are approved by the TT Director are permitted. (TTU Only).

CCR 18.7—Tire grooving is permitted in TTU (only).

Except in TTU, aerodynamic devices and/or modifications may not protrude more than six (6”) inches from the vertical plane from the ground to the widest part of the right and left sides of the vehicle’s body.

Front driver and passenger side fixed/Lexan windows are permitted in TTU (only) if they are factory installed during the manufacturing of the vehicle or if they are made of non-shattering material (Lexan), can be removed from both the inside and outside of the vehicle with no tools required, and allow the driver to comply with the driver emergency exit time requirements in the CCR. (does not apply to TT1, TT2, TT3, [TT4](#))

Front driver and passenger side fixed/Lexan windows are specifically not permitted unless they are factory installed during the manufacturing of the vehicle. Both front side windows must otherwise be in the down position while on track. (applies to TT1, TT2, TT3, [TT4](#)).

### 7.3 Vehicle Modification Restrictions/Limitations (TT1, TT2, TT3, [TT4](#))

#### 7.3.1 Restrictions and Limitations for All Vehicles (Non-Production and Production)

All vehicles must adhere to the following modification restrictions and limitations:

- 1) Active aerodynamic devices and/or modifications (including, but not limited to, computerized, cockpit adjustable, self-adjusting, and OEM) are not permitted. Aerodynamic devices and/or modifications may not protrude more than six (6”) inches from the vertical plane from the ground to the widest part of the right and left sides of the vehicle’s body. [Front wing/spoiler/foil/splitter may not protrude more than 12 inches in front of the outermost edge of the front bodywork/fascia, and may not be higher than the lowest part of the vehicle’s hood.](#)
- 2) Nitrous Oxide use is prohibited. Pre-existing tanks must be removed. Methanol/Alcohol-water injection is permitted provided that the mixture does not exceed 50% alcohol by volume. Methanol is not permitted as a fuel. (see CCR 15.19 and 18.3)
- 3) Sequential, paddle shift/semi-automatic, and dog-ring/straight-cut gears (i.e. non-synchromesh) transmissions are permitted, but will be assessed via the “Adjusted Weight/Power Ratio” formula regardless of whether they are OEM or not.
- 4) Tire treatments and softeners are not permitted. Tire and wheel size are unlimited in [TT1, TT2, and TT3](#), but non-DOT approved tires will be assessed via the “Adjusted Weight/Power Ratio”. [Non-DOT approved tires are not permitted in TT4 unless the TT Director has declared a “rain session”.](#) [DOT-approved R-compound autocross tires shall be assessed via the “Adjusted Weight/Power Ratio” in ST4.](#) [Maximum tire size in TT4 is 275mm.](#)
- 5) Up to two hundred and fifty (250) lbs. of added ballast is permitted. All ballast must be of solid material (no fluids or shot pellets), safely secured in any location on the vehicle approved by NASA safety technical inspectors, [and comply with Section 15.20 of the NASA CCR.](#)
- 6) From the start of competition through the end of post competition inspection, vehicles may not have any adjustments or modifications made to systems that could alter chassis dynamometer readings by changing horsepower levels (without the direct approval of the TT Director.) **Any hardware that allows a competitor or crew**



**member to wirelessly or directly connect to the ECU (or alter ECU maps) at any time during competition or post-competition impound is strictly prohibited, regardless of whether such hardware is external or internal to the ECU, and regardless of the direction of data flow.**

- 7) Tube-frame chassis conversion (partial or complete) is permitted in [TT1](#), [TT2](#), and [TT3](#), but all tube-frame chassis conversion vehicles will be assessed the Modification Factor for “Non-Production” vehicles, and subsequently, none of the other rules specifically for “Production Vehicles Only” will apply (7.3.2). If a vehicle cannot be driven safely, at full speed, with any of the added tubes removed, it is considered a tube-frame chassis conversion.

### 7.3.2 Restrictions and Limitations for Production Vehicles Only

**The following rules do not apply to any [TT1](#), [TT2](#), or [TT3](#) vehicle that is taking the Modification Factor assessment for “Non-Production Vehicle”,** regardless of whether or not the vehicle was originally a Production vehicle. “OEM” is defined as any part that comes from the vehicle manufacturer either as a standard feature, a factory option, or on a factory optional trim model/package of that generation of the street-legal (in the U.S.A.) version of the vehicle.

- A) Other than the listed exceptions, every Production vehicle must retain its unmodified:
- 1) OEM frame rails/rear frame cross beam, and/or Unibody, and Sub-frames/suspension cross-members (in their OEM locations)
  - 2) Strut/shock towers
  - 3) Inner/inboard side of the fender wells (any non-horizontal aspect)
  - 4) Rocker panels
  - 5) Transmission tunnel
  - 6) Floor pan
  - 7) Windshield frame location

The following are permitted exceptions to 7.3.2.A above:

- 1a) Frame rails, sub-frames/suspension cross-members, and unibodies may have maximum diameter 0.75 (3/4) inch holes drilled into them for purposes other than lightening, such as for the attachment of ancillary parts. Cutting and channeling is not permitted.
- 1b) Frame rails may have maximum diameter 1.25 (1-1/4) inch holes drilled solely for the purpose of the placement of jacking lugs/plates.
- 1c) Suspension sub-frames/suspension cross-members may be updated or backdated utilizing any OEM factory produced item that is a direct replacement piece for that model, regardless of year or street-legality, provided that it can be installed in the same location and the same manner as on the donor vehicle without modifications.
- 2a) Strut tower reinforcement plate addition is permitted.
- 2b) Slotting and removal of material from the top surface of the OEM strut/shock tower to the extent necessary to allow simple camber/caster adjustment is permitted.

- 3) The inner/inboard side of the fender well (any non-horizontal aspect) may have holes cut specifically for the purpose of the passage of brake ducts, external shock reservoirs, and brake lines/ABS wires. Plastic fender liners may be modified and/or removed. If the fender well itself is constructed of plastic, it is not considered a “liner”. The front, top, and rear aspects of the fender well may have modifications to allow vent holes for aero and/or cooling purposes (and specifically not for tire height clearance). As such, a component of the topmost aspect of the fender well must remain in the OEM location (but can be made of non-OEM material/venting). [\(note that TT4 has additional Aero limitations below\)](#)
  - 4) Modification of the rocker panels solely for the placement of air jacks.
  - 5) The transmission tunnel may be modified for the purpose of installing a competition driver seat. The floor pan must remain in its original position.
    - 6a) Modifications of the floor pan for purposes of exhaust clearance only, and/or the rocker panel for side exit exhaust only are permitted and will be assessed a Modification Factor in the “Adjusted Weight/Power Ratio”.
    - 6b) Removal of the floor section of the rear hatch/trunk space and either replacement with a sheet metal cover or placement of a fuel cell is permitted without an additional Modification Factor.
    - 6c) Floor pans may have maximum diameter 0.75 (3/4) inch holes drilled into them for purposes of the attachment of ancillary parts, safety gear, seats, and for the passage of wires and hoses, and specifically not for the passage of suspension components.
- B) Production Vehicle Aerodynamics
- 1) A rear wing (or rear spoiler for wagon-style bodies) may not exceed a height of eight (8) inches above the roof-line (or OEM windshield height for convertibles).
  - 2) Modification of the OEM roof line [and/or removal of the front windshield/frame](#) is permitted, but will be assessed via a Modification Factor in the “Adjusted Weight/Power Ratio”.
- C) Production Vehicle Additional Items
- 1) Floor pan modifications to include items such as sub-frame connectors, roll cage bracing, and fuel cell placement may be approved on a case-by-case basis by the National ST Director, and are subject to possible Modification Factor assessments.
  - 2) Relocation of suspension mounting points is permitted [in TT1, TT2, and TT3](#), provided that the modifications do not violate any of the other rules above. One possible method is via the use of modified mounting point brackets attached to OEM mounting locations. [Relocation of suspension mounting points is not permitted in ST4 \(7.3.2.A.1c permitted\)](#).
  - 3) Modifications of transmission cross-members and mounts, differential mounts, and radiator core supports are permitted.

4) Modification of the OEM front bumper frame cross beam is permitted if a modified or replaced bumper beam remains that is equally strong for crash protection.

5) Modification and/or relocation of components of the firewall with engine relocation ten (10) inches or less (i.e. no mid or rear engine conversion) is permitted, but is significantly limited by the requirement to retain the unmodified transmission tunnel and floor pan.

**D) TT3 and TT4 Production Vehicle Aerodynamics (does not apply to TTU, TT1, or TT2)**  
1) “OEM Aero” Modification Factor:

TT4 and TT3 Production vehicles that maintain the unmodified base trim model body lines, do not have non-OEM aerodynamic aides or modifications, and do not have a rear wing or rear spoiler may assess the Modification Factor for “OEM Aero” in calculating the “Adjusted Wt/HP Ratio”. Under this specific rule, an aerodynamic aide is considered non-OEM if it did not come configured on the base trim model (BTM) of the vehicle from the manufacturing factory. Except for those vehicle-specific higher level trim models (non-BTM) listed in Appendix B, there is no updating or backdating across trim models or the addition of dealer installed OEM options permitted.

The following are permitted allowances for vehicles taking the Modification Factor assessment for “OEM Aero”:

- a) Flat undertray/belly pan forward of the centerline of the front axle.
- b) Removal of a convertible soft top/frame and/or adding a hardtop to a convertible provided that the hardtop uses a sealed rear window and is either OEM, an OEM option, or the same shape and size of an OEM/OEM option top.
- c) Lexan front, rear, and rear side windows without uncovered holes.
- d) Front wing window/frame removal and replacement with Lexan.
- e) Hood replacement/modification for venting and/or weight reduction (“aero” hood pins are permitted).
- f) Removal/cutting/drilling of the fascia for engine cooling, air intake, brake ducting, and transponder mounting purposes.
- g) Removal of rain gutters/drip edges, windshield wipers, and mirrors.
- h) Flared and/or rolled fenders. (Only to extent necessary to cover tire as viewed from above)
- i) NACA ducts, air ducts, or air hoses placed in a side window frame solely for the purpose of driver cooling.
- j) Headlamp, headlight covers, and fog lights may all be removed. The holes may be left open, used for brake ducts or engine air intake, or must be covered with material that replicates the shape of the OEM light/cover, leaving the shape of the OEM fascia intact.

**2) TT4 Specific Aerodynamic Modification Allowances (if not using OEM Mod Factor):**

Aerodynamic parts/devices/aides shall be limited in TT4 to the following:

- a) All of the items listed above in section 7.3.2.D.1) “OEM Aero” Modification Factor.
- b) Vertical front air dam (5° tolerance) that follows the outermost edge of the front and side bodywork/fascia.
- c) Single flat, horizontal front splitter that protrudes no greater than 4” from the vehicle.

- d) Single rear wing or spoiler that does not exceed a height of 8” above the roof line, or width greater than the vehicle’s body width, or end plates greater than 12”.
- e) Modified BTM, non-Base Trim Model (non-BTM), or replaced front fascia (unless specifically approved in Appendix D:
  - i) May have nothing attached to it other than specifically allowed items (above).
  - ii) May not have canards/winglets molded into it.
  - iii) Any item that is molded into the fascia that functions as an airfoil, deflector, dive plane, or vortex generator and extends 2” or more past the outline of the immediate surrounding fascia is prohibited. To inspect: a plumb line run across the entire surface of the fascia and bumper shall not have any such item that extends 2” past the line when viewed from above.
- f) Cutting/removal of the rear bumper cover/fascia where it does not cover the rear frame/bumper cross beam.

**E) TT4 Anti-Lock braking systems (ABS)**

For TT4 only—Anti-lock braking systems may only be OEM or offered specifically for the car model (any trim model or generation) as a factory option. No OEM systems offered for a for a different car model or aftermarket systems are permitted.

**7.4 “Adjusted Weight/Power Ratio” Calculation (TT1/TT2/TT3/TT4 only)**

**7.4.1 Definitions (TT1/TT2/TT3/TT4 only)**

The “Adjusted Weight/Power Ratio” for each vehicle will be calculated based on a simple competition weight to **average** chassis dynamometer (Dyno) horsepower ratio (Wt/**Avg** HP), followed by the adjustment of the resulting ratio by adding to, or subtracting from it, based on the list of “Modification Factors” below. Competition weight is defined as the minimum weight of the vehicle, with driver, any time that it competes in a qualifying session or race. Average horsepower calculation (Avg HP) is defined in Section 9.2.

All vehicle weights will be measured to the tenth of a pound (xxxx.x), then rounded off to the nearest pound for all calculations. Any weight ending in “.5” (xxxx.5x) will be rounded up or down to the benefit of the competitor. Any “Adjusted Weight/Power Ratio” calculation ending in “.995” (xx.995) will be rounded up to the benefit of the competitor.

Tire width is determined by the number printed on the tire sidewall by the manufacturer. If a tire does not have a manufacturer’s printed number on the sidewall, then actual tread width measurement (not contact patch) will be used. All DOT-approved tires must be available for purchase by the general public through Federal or state licensed tire dealers.

**7.4.2 Modification Factors (TT1/TT2/TT3/TT4 only)**

The “Modification Factor” listed after each item below is added or subtracted from the actual measured Wt/HP ratio to **calculate** the “Adjusted Wt./HP Ratio” which determines vehicle legality in each TT class.

Competition Weight:

Less than:

3000 lbs = -0.1	
2600 lbs = -0.2	
2200 lbs = -0.3	

Greater than:

3300 lbs = +0.1	3600 lbs = +0.4
3400 lbs = +0.2	3750 lbs = +0.5
3500 lbs = +0.3	3900 lbs = +0.6

Tire Size: Size 245 or smaller (DOT-approved) = +0.7  
 Size 275 to 250 (DOT- approved) = +0.3  
 Size 9.5” (241mm) or smaller (non-DOT approved) = +0.7  
 Size 10.5” (267mm) to 9.6” (244mm) (non-DOT approved) = +0.3

Tire Type: Non-DOT approved tires (TT1, TT2, TT3 Only) = -0.5  
TT4 Only: DOT-approved R-comp Autocross tires = -1.0  
 (examples: A6, A7, R1S, RS AC, Z214-C90/91)

Chassis: Sports racers, “Prototypes”, monocoque race cars (TT1) = -2.2  
 Sports racers, “Prototypes”, monocoque race cars (TT2) = -3.4  
 Other Non-Production Vehicle (TT1, TT2, TT3 only): = -0.4  
 OEM Body Type 4-door Sedan or 5-door Wagon originally manufactured as a Production vehicle = +0.2

Production Vehicle Body Modifications:  
 Modification of the OEM roof line/shape and/or windshield/frame removal = -0.3  
 Modification of the floor pan for exhaust clearance only and/or the rocker panel for side exit exhaust only = -0.2  
TT3 & TT4 Only: OEM Aero (see 7.3.2.D) = +0.4

Transmission:  
 TT1 & TT2: Dog-ring/straight-cut gears (non-synchromesh), and/or sequential/paddle shift/semi-automatic = -0.2  
 TT3 & TT4: OEM street-legal model available paddle shift/ DCT/SMG or sequential motorcycle gearbox = -0.3  
 TT3: Dog-ring/straight-cut gears (non-synchromesh) = -0.6  
 TT3: All other sequential/semi-automatic = -1.0  
 TT4: Dog-ring/straight-cut gears (non-synchromesh) and/or sequential/semi-automatic = -1.0  
 (All classes—no assessment for automatic utilizing torque converter)

Drivetrain:	TT1, TT2, & TT3: AWD	= -0.3
	TT1, TT2, & TT3: FWD	= +1.0
	TT4: AWD	= -0.5
	TT4: FWD	= +0.6

## 7.5 Non-Production Vehicles Approved for “Production” Vehicle Status

The following vehicles are approved to use “Production” vehicle status in TT1, TT2, TT3, and **TT4 provided that the frame/chassis, body/aero remain in the original manufactured configuration** as specified by the manufacturer. The “Chassis” Modification Factors and the “Production Vehicle Body” Modification Factors shall not be assessed, but the vehicle specific Modification Factor listed below for each model will apply:

### No Modification Factor Models:

Backdraft Cobra RT3 (no TD body/no aero, no hardtop, FF Challenge air dam ok) = -0.0  
Dodge SRT10 Viper ACR-X = -0.0 (may have additional Aero mods)  
Dodge Viper Competition Coupe = -0.0 (may have additional Aero mods)  
Ferrari 348, 355, and 360 Challenge Series = -0.0 (TT1 & TT2)  
(may have additional Aero mods)  
Factory Five Roadster (no aero, no hardtop, FF Challenge air dam ok) = -0.0  
Legends = -0.0 (may have additional Aero mods) (TT4 approved)  
Mazda MX-5 Global Cup Racecar = -0.0 (TT4 approved)  
Porsche 996 GT3 Cup & 997 GT3 Cup = -0.0 (TT1 & TT2) (may have additional Aero mods)  
Thunder Roadster pre-'08 body/no-wing type = -0.0 (no aero) (TT4 approved w/ spec. tire)

### With Modification Factor Models:

Allison Legacy = -0.2 (no additional aero) (TT4 approved)  
Baby Grand = -0.2 (no additional aero) (TT4 approved)  
Backdraft Cobra RT3 (TD, hardtop, or any aero mods) = -0.2  
Brunton Stalker (no aero) = -0.2  
Caterham 7, Lotus 7, Wesfield Super 7 (no aero) = -0.2  
Exomotive Exocet (no aero/wing/splitter) = -0.2  
Ferrari 430, 458 Challenge = -0.2 (TT1 & TT2) (may have additional aero mods)  
Factory Five Roadster (if any aero mods, wing, or splitter) = -0.2  
Factory Five Type 65 Coupe = -0.2 (no additional aero)  
Lotus 2-Eleven = -0.2 (no additional aero)  
MNR VortX RT (no aero) = -0.2  
Panoz GTRA = -0.2 (may have additional aero mods) (TT4 approved)  
Panoz GTS = -0.3 (may have additional aero mods)  
Panoz GTWC = -0.2 (may have additional aero mods)  
Porsche 991 GT3 Cup = -0.2 (ST1 & ST2) (may have additional aero mods)  
Porsche 996 GT3 Cup & 997 GT3 Cup = -0.2 (ST3) (may have additional Aero mods)  
Pro Challenge = -0.2 (no additional aero) (TT4 approved)  
RSR (Renault Sport Racer) = -0.6 (TT3 & 4 approved with this Modification Factor only)  
Spec Racer Ford (1<sup>st</sup> & 2<sup>nd</sup> Gen.) = -0.6 (TT3 & 4 approved with this Modification Factor only)  
Spec Racer Ford (3<sup>rd</sup> Gen.) = -1.0 (TT3 approved with this Modification Factor only)  
Thunder Roadster ('08+ aero body/wing type) = -0.2 (may have additional aero mods  
including wing removal) (if N/A 1.6L motor or less, TT3 approved w/ -0.0 Mod Factor)

Note: Future “Production” status approved vehicles and any associated Modification Factor will be posted on the [www.nasaforums.com](http://www.nasaforums.com) website in the Time Trial section, as well as the on the NASA National TT website.

## 7.6 Example Calculations

Example: 2006 Chevrolet Corvette Z06, with OEM transmission, on DOT-approved size 345 tires, weighing 3000 lbs, with 375 Avg rwhp:  
 $3000/375 = 8.0$  (TT2)

Example: 2003 Dodge Viper Comp. Coupe, with OEM transmission, on non-DOT approved size 345 tires, weighing 3601 lbs, with 590 Avg rwhp:  
 $3601/590 = 6.1$ , minus 0.5 (non-DOT’s), plus 0.4 (3601 lbs) = 6.0 (TT1)

Example: 2005 Ford Mustang, with dog-ring gearbox, frame/subframe/floor pan mods, on non-DOT 10.5” slicks, weighing 3305 lbs. with 472 Avg rwhp:  
 $3305/472 = 7.0$ , minus 0.2 (dog box), minus 0.4 (non-Production), minus 0.5 (non-DOT slicks), plus 0.1 (3301 lbs or greater) = 6.01 (TT1)

Example: 2005 Subaru STI (awd, 4-door sedan), with OEM transmission, on DOT-approved 275 size tires, weighing 2901 lbs, with 293 Avg awhp:  
 $2901/293 = 9.90$ , minus 0.3 (AWD), plus 0.2 (4-door), plus 0.3 (275 DOT’s), minus 0.1 (less than 3000 lbs) = 10.0 (TT3)

Example: 2009 Thunder Roadster (aero type, 1.7L), with OEM sequential motorcycle gearbox, on DOT-approved size 245 tires, weighing 1515 lbs, with 150 Avg rwhp:  $1515/150 = 10.10$ , minus 0.3 (sequential motorcycle gearbox), plus 0.7 (245 DOT’s), minus 0.3 (weight less than 2200 lbs), minus 0.2 (Production status approval in TT3) = 10.0 (TT3)

Example: 2008 Porsche 997 GT3 Cup, with OEM sequential transmission, on non-DOT size 320 tires, weighing 2700 lbs, with 397 Avg rwhp:  
 $2700/397 = 6.80$ , minus 0.2 (sequential transmission), minus 0.5 (non-DOT’s), minus 0.1 (less than 3000 lbs), minus 0.0 (Production status approval) = 6.0 (TT1)  
Same car but on size 345 DOT’s at 2800 lbs and 337 Avg rwhp = 8.0 (TT2)

Example: Mazda GT tube-frame rotary with dog ring gearbox, on DOT-approved size 245 tires, weighing 2250 lbs, with 214 Avg rwhp:  
 $2250/214 = 10.5$ , minus 0.4 (non-Production), minus 0.6 (dog gearbox), plus 0.7 (245 DOT’s), minus 0.2 (weight less than 2600 lbs) = 10.0 (TT3)

Note: If one knows the competition weight of the vehicle, a simple reverse calculation will yield the maximum horsepower allowed for that vehicle. Begin by adding/subtracting all of the Modification Factors for the vehicle as listed above. Then use either the 6.00, 8.00, 10.00, or 12.00 ratio (depending on which class the car is being prepped for), and then subtract that number from the ratio to get the vehicles actual target Wt/HP ratio. Divide the competition weight by this number to obtain the horsepower target.

Using the 2008 Porsche 997 GTS Cup example above with the OEM sequential transmission, on non-DOT approved size 320 tires, weighing 2700 lbs:

$$-0.2-0.5-0.1 = -0.8$$

$$6.0 - (-0.8) = 6.0 + 0.8 = 6.8 \text{ (subtraction of the negative number here results in addition)}$$

$$2700/6.8 = 397.06 = 397 \text{ Avg rwhp for TT1}$$

$$2800/8.3 = 337.34 = 337 \text{ Avg rwhp for TT2}$$

(Note: Watch for rounding errors that could lead to non-compliance. If one used 338 rwhp above, the result would be  $2800/338 = 7.984$ , which is less than 8.00:1.)

## 8 TTC, TTD, TTE, TTF Classing

### 8.1 General Car Classification

#### 8.1.1 Base Classes and Modification Points

NASA TTB-TTF consists of 4 competition classes, ~~TTB~~, TTC, TTD, TTE, and TTF. In addition, there are two classes (G & H) that are listed for purposes of base classing only. There will be no competition in either of these classes. Vehicle model groups are defined for classification purposes in Section 8.2 by those vehicles equipped at their original year, make, model, and equipment level specifications, without factory options. **Unless otherwise specified in the base class listing, a vehicle's U.S. domestic market base trim model (BTM), without factory upgrades or options, will be used for purposes of base classing and Modification Points assessment.** The vehicles that are specifically listed and classed below that were never available for retail sale in the U.S.A. will use the base trim package of the vehicle in its primary domestic market. All other non-USDM models need to be assessed by the National TT Director for base classification. Vehicle model groups in Classes C to H, and "TT1-4" (TT1, TT2, TT3, TT4, or TTU) are listed as follows below under their base classification in Section 8.2. **One asterisk \* denotes a seven (7) point initial assessment, and two asterisks \*\* denotes a fourteen (14) point initial assessment that gets added to the total number of Modification Points for the purpose of up-classing.**

Cars may be up-classed as defined below in Section 8.3 based on vehicle modifications. **All factory options and other modifications by the factory that are not included in the basic trim package of a model** (or in the non-basic trim package specifically listed below in 8.2 to assign a TT base class), **must be assessed Modification Points as in Section 8.3.** OEM special edition cars that are not listed under the base classifications need to be verified with National TT Director to determine the correct base class, or whether they will simply be assessed Modification Points for all factory upgrades compared to their standard counterparts. New cars will be classified as they enter competition on a provisional basis. The National TT Director will determine the classifications, and they will be posted on the NASA Time Trial website <https://timetrial.nasaseries.com> in the Rules section. Any changes to base classifications, rules revisions or additions, and Technical Bulletins will also be released on the NASA Time Trial website in the Rules section, and will supersede these rules. Links to these sections will also be provided in the Time Trial forum at [www.nasaforums.com](http://www.nasaforums.com). Any modification waiver(s) approved by the National TT Director for an individual competitor's vehicle will be by e-mail, and a copy of the e-mail must be attached to the competitor's Car Classification Form.



Once a vehicle exceeds the limits of the TTC class (by initial base classing into “TT1-4”, up-classing due to Modification Points, or surpassing the “Adjusted Weight/Horsepower Ratio” limit), it will be classed in either Time Trial 4, (TT4), Time Trial 3 (TT3), Time Trial 2 (TT2), Time Trial 1 (TT1), or TT Unlimited (TTU) based on the criteria set forth in Section 7 of these rules. The definition of the term “Adjusted Weight/Power Ratio” and the method of calculation used in TTC-TTF are located in Appendix B of these rules. Note that the weight tables and Modification Factors used to calculate the “Adjusted Weight/Power Ratio” in TT1/TT2/TT3/TT4 and Super Touring differ from those used in Time Trial D-F (and Performance Touring). **TTC (and PTC) will use the same weight tables and Modification Factors as TT4, as well as Avg HP instead of Maximum Peak HP.**

**The minimum “Adjusted Weight/Power Ratio” for any car in TTC is 14.50:1, regardless of how many points it has, or which base class it begins in. Any car with an “Adjusted Wt/HP Ratio” lower than this cannot compete in TTB-TTF, and moves to one of the TTU/TT1/TT2/TT3/TT4 classes.**

Some NASA race classes and NASA guest classes for purpose-built racecars have been assigned a TT competition classification in 8.2.1. Provided that the vehicle complies with all of the rules for its race class, it is exempt from up-classing in Section 8.3. If the vehicle does not comply with all of the rules of its race class (including tires), then it will need to be re-classified by the National TT Director. Drivers of those vehicles must have an official copy of those rules at the track, available for use during tech inspection. Purpose built racecars and kit cars that do not have a base classification may run in the TTU/TT1/TT2/TT3 classes, depending on their “Adjusted Weight/Power Ratio”. However, some could possibly be classed into lower level classes on an individual basis as they present for competition. Competitors seeking base classification of their vehicle should contact the National TT Director by e-mail ([greg@nasa-tt.com](mailto:greg@nasa-tt.com)). New cars will be classified as they enter competition on a provisional basis.

**All cars with engine swaps, aftermarket forced induction, an upgraded or modified turbocharger/ supercharger, increased number of camshafts, non-OEM heads, or a ported rotary engine, need to be evaluated individually by the NASA National TT Director to determine the correct base class. The competitor must send an e-mail to the National TT Director ([greg@nasa-tt.com](mailto:greg@nasa-tt.com)) to request the re-classification (see section 8.4).**

#### 8.1.2 Minimum “Adjusted Weight/Power Ratios” for each Class

**Each competition class has been assigned a minimum “Adjusted Weight/Power Ratio”. Regardless of how many points a car has, or which base class it begins in, it may not exceed the minimum “Adjusted Weight/Power Ratio” for its competition class. Any vehicle found competing with an “Adjusted Weight/Power Ratio” less than the minimum level assigned below will be disqualified, and additional penalties (Section 14) may be assessed.**

<del>TTB</del>	<del>10.50:1</del>
TTC	14.50:1 (using TT4 formula and Avg HP)
TTD	14.25:1
TTE	16.50:1
TTF	19.50:1

The “Adjusted Weight/Power Ratio” is calculated using the actual chassis dynamometer maximum horsepower of the vehicle (rounded to the nearest whole number) [for TTD-TTF and the Average HP for TTC](#), the actual, measured post-race/qualifying minimum competition weight with driver (Or, at the discretion of the Series Director, the Minimum Competition Weight listed on the TT Car Classification Form if the vehicle was either not weighed in impound, or the Dyno inspection was done at a random time), and other factors such as body type, transmission type, tire type and size. **The method used to calculate the “Adjusted Weight/Power Ratio” is fully described in [Appendix B](#). These minimum “Adjusted Weight/Power Ratios” are not a substitute for base classing followed by calculation of Modification Points to determine the Final Competition Class.** They are an additional limitation placed on vehicles to help achieve a level platform for competition in each class.

Dynamometer testing procedures are outlined in 9.1. However, it is noteworthy that dynamometer tests must be conducted on a Dynojet Model 248 or 224 for front and rear wheel drive vehicles, and on a Dynojet, Mustang, Dyno Dynamics, or Dynapack for AWD cars, in a commercial facility that offers dynamometer testing as part of their business and is open to the public. All (AWD) Dyno test results using a Mustang or Dyno Dynamics dynamometer will have 10% added to the maximum horsepower reading to obtain the number that will be used to calculate the “Adjusted Weight/Power Ratio” (Mustang/Dyno Dynamics Dyno awhp x 1.1 = Maximum awhp for wt/hp calculation).

**It is not a requirement for all drivers to submit Dyno testing results, or for that matter, to have their vehicles Dyno tested before competition.** However, each driver/owner is responsible for ensuring that the vehicle is compliant with the above “Adjusted Weight/Power Ratio” restrictions. If the driver/owner is unsure of the chassis dynamometer maximum horsepower of the vehicle, or if the car is close to the limit for its class, NASA recommends that the driver/owner do appropriate testing of the vehicle before competition.

Vehicles that have more than one fuel/timing program or “map” in the computer/ECU/PCM must submit their estimated horsepower level for each of those fuel/timing “maps” regardless of which one will be used during competition. As well, the method used to switch between these “maps” must be clearly written on the [PT/TT](#) Car Classification Form.

**Any hardware that allows a competitor or crew member to wirelessly or directly connect to the ECU (or alter ECU maps) at any time during competition or post-competition impound is strictly prohibited, regardless of whether such hardware is external or internal to the ECU, and regardless of the direction of data flow.**

NASA has been and continues to actively conduct research on the use of in-car GPS monitoring units as an alternate method of compliance testing of horsepower output. GPS data acquisition monitoring will be used as an additional method of non-invasive compliance testing. Collected data indicating a lack of compliance may be used for disqualification when the National TT Director reviews the data and finds convincing evidence of non-compliance.

## 8.2 Base Classifications

### 8.2.1 Approved NASA Racecar and Guest Racecar Competition TT Classes

These NASA racecar and guest racecar classifications are valid provided that the car meets all of the requirements and restrictions of its own class rules, including tire size and brand if applicable. As well, specific restrictions and specifications that must be adhered to are listed for some of the below models in Appendix C (see Appendix C for details).

<u>Race Class</u>	<u>TT Class</u>
Allison Legacy	TTD (see Appendix A)
Legends (all)	TTC
Mazda MX-5 Global Cup Racecar ('16-'17)	TTC (see Appendix A)
<del>Panoz '97-'99 GTRA</del>	<del>TTB (see Appendix A)</del>
<del>RSR</del>	<del>TTB</del>
<del>Spec Racer Ford (1<sup>st</sup> and 2<sup>nd</sup> Generations only)</del>	<del>TTB (see Appendix A)</del>

### 8.2.2 Base Classification Table and Listed Base Weights

Any tube-frame, never street legal, monocoque purpose-built racecar, vehicle not approved by the DOT, TUV or Japanese government for street use, or production vehicle that does not retain the OEM frame rails and rear frame cross beam and/or unibody\*, strut towers, floor pan, inner/inboard side of the fender wells (any non-horizontal aspect)\*\*, transmission tunnel, rocker panels, windshield frame location, and sub-frame/suspension cross-member, or is converted (partially or wholly) to a tube-frame design, that is not otherwise classed below or in Appendix A, will default to the TTU/TT1/TT2/TT3/TT4 classes until evaluated by the National TT Director for possible homologation into another class. Individual cars may be approved for classing or re-classing by the National TT Director using the vehicle's actual dynamometer measured maximum chassis horsepower and torque, and the Minimum Competition Weight of the vehicle (with driver).

\* a) Frame rails, sub-frames/suspension cross-members, and unibodies may have maximum diameter 0.75 (3/4) inch holes drilled into them for purposes other than lightening, such as for the attachment of ancillary parts. Cutting and channeling is not permitted. b) Frame rails may have maximum diameter 1.25 (1-1/4) inch holes drilled solely for the purpose of the placement of jacking lugs/plates. Modification of the BTM/OEM front bumper frame cross beam is permitted if a modified or replaced bumper beam remains that is equally strong for crash protection. Modification Points may apply as indicated in 8.3.

\*\* The inner/inboard side of the fender well (any non-horizontal aspect) may have holes cut specifically for the purpose of the passage of brake ducts, external shock reservoirs, and brake lines/ABS wires. Plastic fender liners may be modified and/or removed, provided that the fender well itself is not constructed of plastic.

**Any vehicle that has been re-classed by the National TT Director and has had a change to either its base class or its base weight in this table since the re-classification was approved MUST be re-submitted for re-classification.**

**All Official (Dyno) Re-classifications sent by the National TT Director prior to January 1, 2015 must be re-submitted so the re-classification can be verified, and an updated Official Re-Classification e-mail can be sent.**

<u>Make</u>	<u>Model</u>	<u>Class</u>	<u>Wt.</u>	<u>Make</u>	<u>Model</u>	<u>Class</u>	<u>Wt.</u>
Acura	CL 2.2L	TTG	3064	Audi	S3 ('15-'16) (AWD)(turbo)	TT1-4	
Acura	CL V6	TTF*	3470	Audi	S4 ('03-'07)(AWD)	TTC	3869
Acura	CL-S	TTE	3510	Audi	S4 (pre '03)(AWD)	TTD*	3593
Acura	CL-S (6 spd)	TTE	3446	Audi	S8 ('01-'03)(AWD)	TTD**	4068
Acura	ILX 2.4L ('13)	TTE	3000	Audi	TT (180 hp)('00-'06)	TTE	2822
Acura	Integra 1.6L ('86-'89)	TTF	2300	Audi	TT (225 hp)('02-'06)(AWD)	TTD	3220
Acura	Integra 1.8L (non-VTEC)('90-'93)	TTF*	2575	Audi	TT (250 hp)('04-'06)(AWD)	TTD	3351
Acura	Integra 1.8L (non-VTEC)('94-'01)	TTF*	2625	Audi	TT Quattro 3.2L ('08-'09)(AWD)	TTD**	3218
Acura	Integra GS-R	TTE	2667	Audi	TT RS 2.5 Coupe ('12-'13)(AWD)	TT1-4	
Acura	Integra Type-R	TTD	2600	Audi	TTS ('09-'15)(AWD)(turbo)	TTC	3240
Acura	NSX 3.0L ('91-'96)	TT1-4		Austin	Mini 1L (<40hp)	TTG	1358
Acura	NSX	TT1-4		Austin	Mini 1L, 1.1L (40 to 47hp)	TTG	1450
Acura	RL ('05-'07)	TTE	3984	Austin	Mini Cooper (55hp)	TTG	1576
Acura	RL (pre'05)	TTG**	3920	Austin	Mini Cooper 1071S	TTF	1512
Acura	RSX	TTF**	2734	Austin	Mini Cooper 1275S	TTF**	1433
Acura	RSX-S	TTD	2770	BMW	128i Coupe ('08-'09)	TTD	3250
Acura	TL ('04-'05)	TTE*	3465	BMW	135i Coupe ('08-'12)	TT1-4	
Acura	TL 3.2L ('06-'07)	TTE	3580	BMW	135i Convertible ('08-'12)	TTC	3600
Acura	TL Type-S 3.5L ('07-'08)	TTE**	3559	BMW	1 M Coupe ('11)(3.0L turbo)	TT1-4	
Acura	TL (pre '04)	TTF*	3487	BMW	2002 ('68-'74)	TTG**	2282
Acura	TL-S ('02-'03)	TTE	3558	BMW	2002 ('75-'76) (2403 lb)	TTG*	2403
Acura	TL 6-spdt MT SH-AWD ('10-'11)	TTD**	3840	BMW	2002tii	TTE	2225
Acura	TLX 3.5L ('15)	TTD*	3550	BMW	228i ('14-'15)(2.0L turbo)	TTD*	3300
Acura	TLX 3.5L (AWD) ('15)	TTD**	3750	BMW	318 1.8L (E30)(pre-'92)	TTF*	2657
Acura	TSX ('04-'07)	TTF**	3257	BMW	318 (E36)('92-'98)(1.8L & 1.9L)	TTG**	2933
Alfa Romeo	164 ('91-'93)(FWD) (183 hp)	TTF*	3325	BMW	318 ti ('95-'99)	TTF*	2778
Alfa Romeo	1600 Spider	TTF	2250	BMW	323 ('98-'00)(2.5L)	TTF*	3153
Alfa Romeo	2000 Spider	TTE	2288	BMW	325e (121 hp)	TTG**	2780
Alfa Romeo	2600 Spider	TTF**	2683	BMW	325 (E30)('87-'91)(168hp)	TTF**	2855
Alfa Romeo	Milano 2.5L ('87-'89)	TTF*	2907	BMW	325is (E30)('87-'91)(168hp)	TTE	2885
Alfa Romeo	Milano 3.0L ('87-'89)	TTE	2907	BMW	325ic ('92)(168 hp)	TTF*	2990
Audi	90 Quattro ('90-'91)(AWD)	TTF*	3100	BMW	325 ('92-'95)(189 hp)	TTF**	3087
Audi	A3 2.0T (200 hp)('06-'07)	TTF**	3263	BMW	325 ('01-'06)(2.5L184 hp)	TTF**	3197
Audi	A3 3.2 AWD (250 hp)('06-'07)	TTE*	3660	BMW	325i ('06)(3.0L 215hp)	TTE*	3200
Audi	A4 1.8T (150 hp)('97-'00)	TTF	2992	BMW	328 2.8L ('96-'98)(E36)	TTF**	3197
Audi	A4 1.8T (150 hp)(AWD)('97-'99)	TTF	3241	BMW	328 2.8L ('99-'00)(E46)	TTE	3220
Audi	A4 1.8T (170 hp)	TTF	3252	BMW	328i ('07-'12) (3.0L 230 hp)	TTE*	3350
Audi	A4 2.0T (197 hp)('05-'07)	TTF*	3428	BMW	328i ('12-'15) (2.0L turbo)	TTD	3465
Audi	A4 2.0T AWD (200 hp)('05-'07)	TTF**	3549	BMW	330 ('01-'06)(225hp)	TTE*	3285
Audi	A4 2.8L (190 hp)	TTF**	3263	BMW	330 ('06)(255hp)	TTD	3400
Audi	A4 3.0L (220 hp)	TTF**	3462	BMW	335i ('07-'13) (3.0L turbo)	TT1-4	
Audi	A4 3.2L (255 hp)(AWD)('07)	TTE**	3671	BMW	335d ('09-'11)(3.0L turbo diesel)	TTC	3650
Audi	A6 2.7T (AWD)	TTE	3958	BMW	5 series (<226hp)(RWD)(inc '07)	TTF**	3494
Audi	A6 4.2L ('00-'04)(AWD)	TTE*	4024	BMW	5 series (RWD)('08)	TTE	3500
Audi	A6 4.2L ('05-'06)(AWD)	TTE**	4145	BMW	540 ('97-'03)	TTE**	3803
Audi	A6 4.2L ('07)(AWD)	TTD	4222	BMW	M Coupe/Roadster (240hp)	TTD	3131
Audi	A8 4.2L (AWD)('97-'03)	TTE**	4068	BMW	M Coupe (315 hp)	TT1-4	
Audi	A8 4.2L (AWD)('03-'06)	TTE**	4288	BMW	M Roadster (315 hp)	TT1-4	
Audi	A8 4.2L (AWD)('07)	TTD	4288	BMW	M235i Coupe ('14-'15)(3.0L)	TT1-4	
Audi	A8 6.0L (AWD)('05-'07)	TTC	4729	BMW	M3 (E30)(pre-'89)	TTE**	2733
Audi	Coupe (110 hp)('80-'88)	TTG**	2507	BMW	M3 (E30)('89-'91)	TTE*	2865
Audi	Coupe (130 hp)('80-'88)	TTF	2507	BMW	M3 (E36)('95-'99)	TTD*	3175
Audi	RS 4 (4.2L) (AWD)('07)	TT1-4		BMW	M3 (E46)('01-'06)	TT1-4	

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BMW	M3 Convertible (E46)('01-'06)	TTC	3780	Chevrolet	Aveo ('04-'07)	TTG*	2365
BMW	M3 (E90, E92, E93)('08-'13)	TT1-4		Chevrolet	Camaro 3.1L	TTG*	3105
BMW	M3 (E80)('15)	TT1-4		Chevrolet	Camaro 3.4L	TTG*	3306
BMW	M4 (E80)('15)	TT1-4		Chevrolet	Camaro 3.6L ('12-'15)	TTD*	3760
BMW	M5 E28,E34('85-'93)	TTD*	3788	Chevrolet	Camaro 3.8L	TTF*	3307
BMW	M5 E39 ('00-'03)	TT1-4		Chevrolet	Camaro 5.0L carb (170 hp)('87)	TTF**	3250
BMW	M5 E60 ('06-'08)	TT1-4		Chevrolet	Camaro SS ('98-'02)	TTC*	3433
BMW	M6	TTE*	3570	Chevrolet	Camaro SS ('96-'97)	TTC	3439
BMW	M6 ('06-'08)	TT1-4		Chevrolet	Camaro SS ('10-'11)	TT1-4	
BMW	MINI Clubman S ('08-'10)	TTE*	2800	Chevrolet	Camaro SS ('12)	TT1-4	
BMW	MINI Clubman Works ('09-'11)	TTD**	2890	Chevrolet	Camaro Z28 ('98-'02)	TTC	3439
BMW	MINI Clubman Works ('12-'13)	TTC	2830	Chevrolet	Camaro Z28 (pre '98)	TTD	3441
BMW	MINI Cooper ('01-'04)	TTF	2315	Chevrolet	Camaro ZL1 ('12)	TT1-4	
BMW	MINI Cooper ('05-'10)	TTG**	2546	Chevrolet	Cavalier	TTF	2617
BMW	MINI Cooper ('11-'12)	TTF	2535	Chevrolet	Cavalier Z24	TTF*	2611
BMW	MINI Cooper S ('02-'04)	TTE**	2513	Chevrolet	Cobalt 2.2L ('05-'08)	TTG*	2991
BMW	MINI Cooper S ('05-'10)	TTE**	2678	Chevrolet	Cobalt 2.4L ('06-'08)	TTF	2991
BMW	MINI Cooper Works ('06-'08)	TTD*	2720	Chevrolet	Cobalt SS 2.0L (S/C)('05-'07)	TTE*	2991
BMW	MINI Cooper Works ('09-'11)	TTC*	2680	Chevrolet	Cobalt SS (turbo)('08)	TTC*	2975
BMW	MINI Cooper Works ('12-'13)	TTC*	2710	Chevrolet	Corvair (140hp)	TTF**	2500
BMW	Z3 4-cyl	TTF*	2701	Chevrolet	Corvair (95,100hp)	TTG	2500
BMW	Z3 6-cyl (2.5L)	TTE	2932	Chevrolet	Corvair Corsa Turbo	TTE*	2500
BMW	Z3 6-cyl (2.8L)	TTE*	2943	Chevrolet	Corvair Monza GT Spyder	TTF**	2570
BMW	Z3 6-cyl (3.0L)	TTD	2943	Chevrolet	Corvette '63-'82 (>200, <330 hp)	Dyno	
BMW	Z4 2.5L	TTE	2932	Chevrolet	Corvette '63-'82 (>330,<425 hp)	TT1-4	
BMW	Z4 3.0L ('03-'05)	TTD	3000	Chevrolet	Corvette '63-'82 (>425 hp)	TT1-4	
BMW	Z4 3.0L (215 hp)('06-'08)	TTE*	3100	Chevrolet	Corvette '63-'82 (200hp)	Dyno	
BMW	Z4 3.0L (255 hp)('06-'08)	TTD**	3108	Chevrolet	Corvette C4 ('85-'91)	TTD**	3280
BMW	Z4 M ('06-'08)	TT1-4		Chevrolet	Corvette C4 ('92-'96) (LT1)	TT1-4	
BMW	Z4 sDrive28i ('12-'14) (turbo)	TTD**	3260	Chevrolet	Corvette C4 (LT4 oTTion) (330 hp)	TT1-4	
BMW	Z4 sDrive30i ('09-'11)	TTD*	3240	Chevrolet	Corvette C5 (inc. FRC w/o Z51)	TT1-4	
BMW	Z4 sDrive35i ('09-'14) (turbo)	TT1-4		Chevrolet	Corvette C5 (all w/ Z51)	TT1-4	
BMW	Z4 sDrive35is ('11-'14) (turbo)	TT1-4		Chevrolet	Corvette C6 ('05-'07)(Z51 ok)	TT1-4	
BMW	Z8	TT1-4		Chevrolet	Corvette C6 ('08)(LS3)	TT1-4	
Buick	Gran Sport 455 ('70)	TTC*	3600	Chevrolet	Corvette GS ('96)	TT1-4	
Buick	Regal 3.8L ('97-'04)	TTF**	3300	Chevrolet	Corvette GS ('10+)	TT1-4	
Cadillac	ATS 2.0L (turbo)('13)	TTC	3360	Chevrolet	Corvette Z06 ('01-'04)	TT1-4	
Cadillac	ATS 2.0L AWD (turbo)('13)	TTC	3540	Chevrolet	Corvette Z06 ('06-'08)	TT1-4	
Cadillac	ATS 2.5L ('13)	TTE*	3360	Chevrolet	Corvette ZR-1 ('90-'95)	TT1-4	
Cadillac	ATS 3.6L ('13)	TT1-4		Chevrolet	Cruze 1.4L Turbo ('11-'12)	TTF	2950
Cadillac	ATS 3.6L AWD ('13)	TT1-4		Chevrolet	Cruze 1.8L ('11)	TTG*	3000
Cadillac	Catera	TTG**	3762	Chevrolet	Cruze 1.4L Turbo Eco ('11-'12)	TTF	2950
Cadillac	CTS 2.8L ('05-'07)	TTF*	3509	Chevrolet	HHR SS ('08-'10)	TTD*	3280
Cadillac	CTS 3.6L ('03-'07)	TTE*	3509	Chevrolet	Impala SS ('04-'05)	TTF*	3606
Cadillac	CTS-V ('04-'07)	TT1-4		Chevrolet	Impala SS ('06-'08)	TTE*	3711
Cadillac	CTS-V ('09-'11)	TT1-4		Chevrolet	Impala SS ('94-'96)	TTF*	4036
Cadillac	CTS-V Sports Wagon ('11)	TT1-4		Chevrolet	Malibu ('08-'11) 2.4L	TTG*	3415
Cadillac	STS (4.6 V8) AWD ('05)	TTD	4295	Chevrolet	Malibu LS ('04-'05) 3.5L V6	TTF**	3200
Cadillac	STS (V6)('05-'07)	TTF**	3858	Chevrolet	Monte Carlo 3.9L LTZ ('06)	TTF**	3501
Cadillac	STS (V8)('05-'07)	TTE**	3940	Chevrolet	Monte Carlo SS 3.8L ('04-'05)	TTE	3391
Cadillac	STS-V ('06-'07)	TTC*	4233	Chevrolet	Monte Carlo SS 5.3L ('06-'07)	TTD	3490
Cadillac	XLR ('04-'07)	TTD**	3647	Chevrolet	Monte Carlo SS (pre '04)	TTF	3333
Cadillac	XLR-V 4.4L V8 ('07)	TT1-4		Chevrolet	S10 Extreme (180hp)	TTF	3216
Caterham	Super 7 (240 hp)	TT1-4		Chevrolet	Sonic (1.4L turbo)('12)	TTF**	2600

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Chevrolet	Sonic (1.8L)('12)	TTF*	2600	Eagle	Talon 2.0L (135-140hp)	TTG**	2739
Chevrolet	Spark ('13-'14)	TTG	2270	Eagle	Talon Turbo ('90-'94)	TTE	2789
Chevrolet	Volt ('11-'12)	TTF	3780	Eagle	Talon Turbo ('95-'98)	TTE*	2866
Chrysler	300 (3.5L) ('05-'07)	TTF*	3650	Eagle	Talon Turbo AWD ('90-'94)	TTE*	3108
Chrysler	300C (5.7L)('05-'07)	TTE**	4066	Eagle	Talon Turbo AWD ('95-'98)	TTE*	3153
Chrysler	300C (5.7L) (AWD)('05-'07)	TTE**	4273	Ferrari	308	TTD	3159
Chrysler	300C SRT8 ('05-'07)	TTC	4160	Ferrari	328	TT1-4	
Chrysler	Cirrus 4-cyl	TTG*	3141	Ferrari	355	TT1-4	
Chrysler	Conquest (turbo)	TTF**	2900	Ferrari	360	TT1-4	
Chrysler	Conquest Tsi (turbo)	TTF**	3050	Ferrari	430	TT1-4	
Chrysler	Crossfire (215hp) ('04-'07)	TTE	3010	Ferrari	550	TT1-4	
Chrysler	Crossfire SRT6 ('05-'06)	TT1-4		Ferrari	612	TT1-4	
Chrysler	PT Cruiser	TTG	3147	Ferrari	348 (<305 hp)	TTC*	3233
Chrysler	PT Cruiser GT	TTF**	3364	Ferrari	348 (320 hp)	TT1-4	
Datsun	510 (96 hp)	TTF*	2040	Ferrari	360 Challenge	TT1-4	
Datsun	510 (L20B swap)	TTF**	2150	Ferrari	456GT	TT1-4	
Datsun	1600 Roadster ('66-'70)(96hp)	TTF	2030	Ferrari	575M	TT1-4	
DeTomaso	Pantera	TT1-4		Ferrari	Enzo	TT1-4	
Diasio	D962R	TTR	1400	Ferrari	F430	TT1-4	
Dodge	Caliber RT 2.4L AWD ('07-'08)	TTF	3308	Ferrari	Superamerica	TT1-4	
Dodge	Caliber SRT4 2.4L Turbo ('07-'08)	TTD**	3200	Ferrari	Testarossa	TT1-4	
Dodge	Challenger R/T ('09-'10)	TTD**	4140	Fiat	124 Spider 1400	TTG**	2083
Dodge	Challenger SRT8 ('08-'10)	TTC*	4140	Fiat	124 Spider 1600	TTF*	2116
Dodge	Charger 3.5L ('06-'07)	TTF**	3800	Fiat	124 Spider 1800	TTF**	2116
Dodge	Charger 5.7L ('06-'07)	TTD*	4031	Fiat	124 Sport Spider 2000	TTG*	2359
Dodge	Charger SRT8 ('06-'10)	TTC*	4140	Fiat	128 (55-60 hp)	TTG	1730
Dodge	Dart 1.4L Turbo ('14)	TTF	3180	Fiat	500 ('12-13)(USA)	TTG*	2400
Dodge	Dart 2.0L ('13-'14)	TTG**	3180	Fiat	500 Abarth (1.4L T)('12-'13)(USA)	TTE*	2590
Dodge	Dart 2.4L ('14)	TTF*	3180	Fiat	500e ('13-'15)(electric)	TTF	2950
Dodge	Magnum RT	TTE*	4180	Fiat	X1-9 1.3L	TTG*	1940
Dodge	Magnum RT AWD	TTE**	4393	Fiat	X1-9 1.5L	TTG**	2030
Dodge	Magnum SRT8	TTC	4260	Fiat	X1-9 2000	TT1-4	
Dodge	Neon DOHC Coupe	TTF	2550	Ford	Contour SVT	TTF**	3126
Dodge	Neon DOHC Sedan	TTF	2550	Ford	Escort 1.9L	TTH*	2356
Dodge	Neon SOHC Coupe	TTF	2400	Ford	Escort 2.0L	TTG*	2457
Dodge	Neon SOHC Sedan (1st gen)	TTF	2400	Ford	Escort GT (1.8L)	TTF	2375
Dodge	Neon SOHC Sedan (2nd gen)	TTF	2450	Ford	Escort ZX2	TTF	2400
Dodge	Neon SRT4 ('03-05)	TTE*	2970	Ford	Escort ZX2 S/R	TTF*	2450
Dodge	Neon SRT4 ACR	TTE**	2900	Ford	EXP 1.6L ('82-'85)	TTG	2130
Dodge	Shelby Charger (110hp)	TTG**	2296	Ford	F150 SVT Lightning	TTE*	4670
Dodge	Shelby Charger (146hp)	TTF*	2500	Ford	Festiva	TTH**	1797
Dodge	Shelby Charger GLHS (turbo)	TTE	2550	Ford	Fiesta ('11-'14)	TTG**	2575
Dodge	Shelby Lancer	TTF	3000	Ford	Fiesta ST ('14)(turbo)	TTE**	2675
Dodge	Shelby Omni GLH (146 hp)	TTF*	2500	Ford	Focus (2.0L 16v)('00-'04)	TTG**	2600
Dodge	Shelby Omni GLHS	TTE	2540	Ford	Focus (2.0L 16v)('05-'11)	TTF	2550
Dodge	Stealth (DOHC)	TTE	3153	Ford	Focus (2.0L 16v)('12-'13)	TTF*	2820
Dodge	Stealth (SOHC)	TTF	3086	Ford	Focus (2.0L 8v)('00-'02)	TTG	2606
Dodge	Stealth Turbo ('91-'93)(AWD)	TTD	3803	Ford	Focus (2.3L 16v)('04)	TTF	2612
Dodge	Stealth Turbo ('94-'96)(AWD)	TTC	3671	Ford	Focus RS ('16)(AWD)(turbo)	TT1-4	
Dodge	Stratus 4-cyl	TTG	3192	Ford	Focus ST 2.3L 16v ('07)	TTF*	2636
Dodge	Stratus RT	TTF	3219	Ford	Focus ST 2.0L (turbo)('13-'15)	TTD*	3200
Dodge	Viper	TT1-4		Ford	Focus SVT (2.0L)('02-'04)	TTF**	2750
Dodge	Viper ACR	TT1-4		Ford	Focus ZX4 ST (2.3L)('05-'06)	TTF*	2636
Dodge	Viper Comp. Coupe	TT1-4		Ford	GT	TT1-4	

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Ford	Mustang 2.3L turbo ('15)	TT1-4		Geo	Metro 1.0L	TTH**	1804
Ford	Mustang Boss 302 ('12)	TT1-4		Geo	Metro 1.3L	TTH**	1940
Ford	Mustang Boss 302 ('13)	TT1-4		Geo	Prizm	TTF	2359
Ford	Mustang Cobra ('93)	TTE*	3354	Geo	Storm	TTG	2282
Ford	Mustang Cobra ('94-'95)	TTE*	3354	Geo	Storm GSI	TTF*	2480
Ford	Mustang Cobra ('96-'98)	TTC	3393	Honda	Accord 2.0L (120hp)	TTG*	2670
Ford	Mustang Cobra ('99 & '01)	TTC*	3285	Honda	Accord 2.2L ('90-'97)(130hp)	TTG*	2800
Ford	Mustang Cobra R ('00)	TT1-4		Honda	Accord EX 2.2L ('94-'97)(145hp)	TTG**	2950
Ford	Mustang Cobra R ('93)	TTD*	3248	Honda	Accord 2.3L	TTG**	2976
Ford	Mustang Cobra R ('95)	TTC*	3325	Honda	Accord 2.4L ('03-'07)	TTF	3097
Ford	Mustang Cobra SVT ('02+)	TT1-4		Honda	Accord 2.7 V6 ('95-'97)	TTF	3219
Ford	Mustang GT ('05-'06)	TTD**	3450	Honda	Accord 3.0 V6 ('03-'07)	TTE	3303
Ford	Mustang GT ('07-'09)	TTC	3356	Honda	Accord 3.0 V6 ('98-'02)	TTF*	3197
Ford	Mustang GT ('10)	TTC	3530	Honda	Accord 3.5 V6 ('08-'12)(AT ok)	TTD	3350
Ford	Mustang GT ('11-'12)	TT1-4		Honda	Civic 1.6L SOHC ('88-'91)	TTF	2291
Ford	Mustang GT ('13+)	TT1-4		Honda	Civic Base ('88-'91)	TTG	2127
Ford	Mustang I4	TTH**	2699	Honda	Civic Coupe 1.8L ('06-'08)	TTF*	2586
Ford	Mustang I4 turbo	TTG*	3065	Honda	Civic CX ('92-'95)	TTG	2094
Ford	Mustang I6	TTG	2800	Honda	Civic del Sol S (<107hp)	TTG**	2302
Ford	Mustang Mach 1	TTD**	3450	Honda	Civic del Sol Si (<128hp)	TTF*	2414
Ford	Mustang SVO ('84-'86)	TTE	3036	Honda	Civic del Sol VTEC (DOHC 1.6L)	TTE	2522
Ford	Mustang V6 (pre-'99)	TTG**	3065	Honda	Civic DX 1.5L 16v ('88-'91)	TTG**	2165
Ford	Mustang V6 ('99-'04)	TTF**	3351	Honda	Civic EX 1.6L ('92-'95)	TTF	2390
Ford	Mustang V6 ('05-'09)	TTF**	3351	Honda	Civic EX 1.6L ('96-'00)	TTF	2440
Ford	Mustang V6 ('10)	TTE	3350	Honda	Civic EX 1.7L ('01-'05)	TTF	2597
Ford	Mustang V6 ('11-'12)	TTD**	3600	Honda	Civic EX 2.0L ('16)	TTF**	2850
Ford	Mustang V6 ('13-'14)	TTC*	3400	Honda	Civic EX-T 1.5L ('16)(turbo)	TTE*	2850
Ford	Mustang V6 ('15)	TTC*	3500	Honda	Civic Non-VTEC (92hp)	TTF	1950
Ford	Mustang V8 ('64-'68 <272 hp)	TTF*	2980	Honda	Civic Si 1.6L ('92-'95)	TTF	2390
Ford	Mustang V8 ('69-'70 <291 hp)	TTF*	3250	Honda	Civic Si 1.6L ('99-'00)	TTF**	2612
Ford	Mustang V8 ('71-'73 <286 hp)	TTF	3560	Honda	Civic Si 2.0L ('01-'05)	TTF*	2782
Ford	Mustang V8 ('79-'86 <226 hp)	TTE	3075	Honda	Civic Si 2.0L ('06-'11)	TTE*	2877
Ford	Mustang V8 LX ('87-'93 <226 hp)	TTE	3075	Honda	Civic Si 2.4L ('12)	TTE**	2820
Ford	Mustang V8 GT ('87-'93 <226 hp)	TTE	3120	Honda	Civic Si 2.4L ('13-'14)	TTE**	2860
Ford	Mustang V8 ('94-'98 <226 hp)	TTE*	3075	Honda	Civic Type R ('07) (JDM)(225 hp)	TTC	2792
Ford	Mustang V8 ('99-'04)	TTE**	3273	Honda	Civic VX (92hp)	TTG**	2094
Ford	Pinto 1.6L	TTG	2000	Honda	CRX DX 1.5L 16v ('88-'91)	TTG**	2103
Ford	Pinto 2.0L ('71-'74)	TTG	2235	Honda	CRX DX 12v ('85-'87)	TTG**	1865
Ford	Pinto 2.3L	TTG*	2250	Honda	CRX HF	TTG	1967
Ford	Pinto 2.8L	TTG*	2570	Honda	CRX Si 1.5L ('85-'87)	TTF**	1978
Ford	Probe GT	TTF*	2875	Honda	CRX Si ('88-'91)	TTF*	2174
Ford	Probe Turbo	TTF*	2730	Honda	CRX 1.6L DOHC VTEC	TTE	2436
Ford	Sierra Cosworth 2.0L T (204 hp)	TTE**	2756	Honda	CR-Z (1.5L Hybrid)('11)	TTF	2650
Ford	Sierra Cosworth AWD (220 hp)	TTD*	2816	Honda	Fit ('07-'08)	TTG*	2432
Ford	Shelby GT500 5.4L S/C ('07-'09)	TT1-4		Honda	Fit ('09-'12)	TTG**	2500
Ford	Shelby GT500 5.4L S/C ('10-'11)	TT1-4		Honda	Prelude S ('92-'96)	TTG**	2775
Ford	Taurus GL	TTH**	3326	Honda	Prelude Si ('92-'96)	TTF*	2866
Ford	Taurus SHO	TTF**	3379	Honda	Prelude Si (pre-'92)	TTF	2639
Ford	Thunderbird Super Coupe/Turbo	TTF**	3536	Honda	Prelude VTEC ('93-'01)	TTF**	2954
Ford	Thunderbird Turbo Coupe	TTF*	3450	Honda	S2000 (2.0L)('00-'03)	TTD**	2850
Ford	Thunderbird V6 (pre-'02)	TTH**	3536	Honda	S2000 (2.2L)('04-'08)	TTC	2850
Ford	Thunderbird V8 ('02)	TTF**	3775	Honda	S2000 CR (2.2L)('08)	TTC**	2813
Ford	Thunderbird V8 ('03+)	TTE	3775	Hyundai	Accent 1.5L (105hp)	TTF*	2149
Ford	Thunderbird V8 ('90-'97)	TTF*	3536	Hyundai	Accent 1.6L ('01-'08)	TTG**	2366

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Hyundai	Elantra 1.6L	TTG**	2500	Lexus	GS300 ('93-'05)	TTF*	3649
Hyundai	Elantra 1.8L	TTF	2453	Lexus	GS350 ('07-'08)	TTD	3704
Hyundai	Elantra 2.0L ('00-'08)	TTF	2626	Lexus	GS400	TTE**	3693
Hyundai	Genesis 3.8L ('09-'10)	TTE*	3750	Lexus	GS430 ('01-'07)	TTE**	3745
Hyundai	Genesis 4.6L ('09-'10)	TTD**	4000	Lexus	GS460 ('08)	TTD	3945
Hyundai	Genesis Coupe 2.0L Turbo ('10-'12)	TTD*	3300	Lexus	IS250 ('06-'08)(6sp man.)	TTF	3450
Hyundai	Genesis Coupe 2.0L Turbo ('13)	TTC	3360	Lexus	IS250 (AWD)('06-'08)	TTF**	3650
Hyundai	Genesis Coupe 2.0L T Track ('10-'12)	TTC	3300	Lexus	IS F ('08-'09)	TT1-4	
Hyundai	Genesis Coupe 3.8 V6 ('10-'12)	TTC*	3400	Lexus	IS300	TTF**	3255
Hyundai	Genesis Coupe 3.8 V6 Track ('10-'12)	TT1-4		Lexus	IS350 ('16)	TT1-4	
Hyundai	Genesis Coupe 3.8 V6 Track ('13)	TT1-4		Lexus	IS350 (AWD)('16)	TT1-4	
Hyundai	Sonata 2.4L ('09-'10) (auto ok)	TTG**	3260	Lexus	LS400	TTE	3890
Hyundai	Tiburon 2.0L ('03-'07)	TTG	2940	Lexus	LS430	TTE	3990
Hyundai	Tiburon 2.0L ('97-'01)	TTF	2633	Lexus	LS460 ('07-'08)	TTD	4244
Hyundai	Tiburon V6 2.7L ('03-'07)	TTF*	2986	Lexus	SC300	TTF*	3560
Hyundai	Tiburon V6 GT LTD 2.7L ('06-'08)	TTF	3150	Lexus	SC400	TTE*	3655
Hyundai	Veloster 1.6L ('12-'13)	TTF	2584	Lexus	SC430 ('02-'08)	TTE*	3840
Hyundai	Veloster 1.6L Turbo ('13)	TTE	2925	Lincoln	LS (V8) ('03-'06)	TTE	3772
Infiniti	G20 ('93-'02)	TTG	2990	Lotus	Elan M100 ('91-'92)(turbo)	TTD	2250
Infiniti	G20 ('91-'92)	TTF	2535	Lotus	Elise ('05-'07)	TTC**	1975
Infiniti	G35 (incl. 6MT) (pre-'05)	TTD	3435	Lotus	Esprit (V8) TT	TT1-4	
Infiniti	G35 (incl. 6MT)('05-'06)	TTD	3524	Lotus	Esprit 4 Turbo	TT1-4	
Infiniti	G35 Coupe 6MT ('07)	TTD	3524	Lotus	Evora ('10-'14)	TT1-4	
Infiniti	G35 (306 hp)(incl. Sport)('07-'08)	TTD*	3532	Lotus	Exige ('06)	TT1-4	
Infiniti	G35x (AWD)('07-'08)	TTD**	3650	Lotus	Exige S ('07)	TT1-4	
Infiniti	G37 (7 sp auto)('09-'11)	TT1-4		Lotus	Exige 240R, S240, S260	TT1-4	
Infiniti	I30 ('00-'01)	TTF**	3342	Maserati	GranTurismo	TT1-4	
Infiniti	I30 ('96-'99)	TTF*	3090	Mazda	323 (pre'95--82hp)	TTG	2075
Infiniti	I35	TTE*	3342	Mazda	323 GTX (1.6L T)	TTF	2645
Infiniti	Q45 ('02-'07)	TTE*	4153	Mazda	626 2.0L	TTG	2864
Infiniti	Q45 (pre-'02)	TTF**	3895	Mazda	626 2.5L V6	TTF	3023
Jaguar	S-Type 3.0L (235 hp)	TTF**	3777	Mazda	Mazda2 ('11)	TTG*	2355
Jaguar	S-Type 4.0L, 4.2L	TTE**	3874	Mazda	Mazda3 2.0L ('04-'06)	TTF*	2696
Jaguar	S-Type R 4.2L S/C ('03-'04)	TTD**	4046	Mazda	Mazda3 2.0L ('07-'10)	TTF	2780
Jaguar	S-Type R 4.2L S/C ('05-'07)	TTC	4075	Mazda	Mazda3 2.3L ('04-'06)	TTF*	2762
Jaguar	XJ Vanden Plas (<301 hp)	TTE*	3819	Mazda	Mazda3 2.3L ('07-'09)	TTF	2930
Jaguar	XJ8 3.5L	TTE	3613	Mazda	Mazda3 2.5L ('10-'13)	TTF*	2930
Jaguar	XJ8 4.2L	TTE**	3613	Mazda	Mazda3 2.5L ('14-'15)	TTF**	2980
Jaguar	XJ8 S/C ('00-'07)	TTC	4001	Mazda	Mazda6 2.3L ('03-'06)	TTF	3042
Jaguar	XJR ('98-'07)	TTC	3958	Mazda	Mazda6 2.3L ('07-'08)	TTG**	3091
Jaguar	XJS ('88-'91)	TTF**	3915	Mazda	Mazda6 2.5L ('09-'13)	TTF	3250
Jaguar	XKR-SC ('00-'06)	TTC*	3865	Mazda	Mazda6 2.5L ('14-'16)	TTF*	3200
Jaguar	XKR-SC ('07)	TT1-4		Mazda	Mazda6 3.0L (V6) ('03-'05)	TTF**	3243
Jaguar	XKE	TTD*	3100	Mazda	Mazda6 3.0L (V6) ('06-'08)	TTF*	3320
Jaguar	X-Type ('02-'07) AWD	TTE	3538	Mazda	Mazda6 3.7L (V6) ('08-'13)	TTE**	3540
Jensen-Healey	2.0L ('73-'76)	TTE*	2240	Mazda	Mazdaspeed Protégé (Turbo)	TTF**	2843
Kia	Forte (2.0L) ('10-'12)	TTF	2780	Mazda	Mazdaspeed3 (turbo)('07-'09)	TTD*	3153
Kia	Forte 5-door (2.0L) ('11-'12)	TTF	2780	Mazda	Mazdaspeed3 (turbo)('10-'13)	TTD*	3215
Kia	Rio ('06-'11)	TTG**	2355	Mazda	Mazdaspeed6 (AWD)('06-'07)	TTD*	3589
Kia	Rio ('12-'13)	TTF*	2440	Mazda	Miata 1.6L	TTF**	2185
Kia	Sephia	TTF	2472	Mazda	Miata 1.8L ('94-'97)	TTE	2335
Kia	Spectra	TTG*	2701	Mazda	Miata 1.8L ('99-'00)	TTE	2410
Lamborghini	Diablo VT	TT1-4		Mazda	Miata 1.8L VVT ('01-'05)	TTE*	2400
Lexus	GS300 ('06)	TTE	3536	Mazda	Miata MX-5 ('06-'15)	TTE*	2625



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Mazda	Miata MX-5 ('16)	TTE**	2400	Mercury	Capri 2.0L ('72-'74)	TTG*	2275
Mazda	Miata MX-5 turbo ('04-'05)	TTE**	2600	Mercury	Capri 2.3L ('76-'77)	TTH**	2491
Mazda	MX-3	TTG*	2443	Mercury	Capri 2.6L, 2.8L ('72-'74)	TTF	2275
Mazda	MX-3 GS	TTF	2582	Mercury	Capri 2.8L ('76-'77)	TTH*	2800
Mazda	MX-6 (2.2L)(110hp)	TTG*	2560	Mercury	Cougar 2.5L V6	TTF*	2892
Mazda	MX-6 GT (turbo)	TTF*	2729	Mercury	Marauder	TTE	4195
Mazda	MX-6 V6 ('92-'97)	TTF*	2800	Merkur	XR4Ti	TTE	2920
Mazda	Protegé 1.6L	TTG	2493	MG	Midget 1.1l, 1.3l, 1.5l	TTF	1515
Mazda	Protegé 1.8L	TTF	2385	Mitsubishi	3000 VR-4 ('91-'93)(AWD)	TTD	3803
Mazda	Protegé 2.0L	TTF	2634	Mitsubishi	3000 VR-4 ('94-'99)(AWD)	TTD**	3760
Mazda	Protegé 5	TTG*	2716	Mitsubishi	3000GT (NA-DOHC)	TTE	3219
Mazda	Protegé MP3	TTG**	2725	Mitsubishi	3000GT (NA-SOHC)	TTF	3131
Mazda	RX-3 ('72-'78) (12A)	TTG**	2280	Mitsubishi	Eclipse 2.4L (pre-'06)	TTG**	2965
Mazda	RX-7 12A	TTG**	2345	Mitsubishi	Eclipse 2.4L ('06-'08)	TTG*	3274
Mazda	RX-7 13B	TTE	2800	Mitsubishi	Eclipse GT 3.8L ('06-'08)	TTE*	3472
Mazda	RX-7 13B GSL-SE (1st Gen)	TTF**	2512	Mitsubishi	Eclipse GT 3.0L ('00-'05)	TTF**	3142
Mazda	RX-7 TT (3rd Gen)	TT1-4		Mitsubishi	Eclipse Turbo ('90-'94)	TTE	2778
Mazda	RX-7 Turbo II (2nd Gen)	TTD	2775	Mitsubishi	Eclipse Turbo ('95-'98)	TTE*	2877
Mazda	RX-8 ('04-'08)	TTD	3045	Mitsubishi	Eclipse Turbo ('99)	TTE	2970
Mazda	RX-8 ('09-'11)	TTD*	3045	Mitsubishi	Eclipse Turbo AWD ('92-'94)	TTE*	3093
Mazda	RX-8 R3 ('09-'11)	TTC	3045	Mitsubishi	Eclipse Turbo AWD ('95-'98)	TTE*	3157
Mazda	RX-8 (197 hp)(Auto)('04-'05)	TTE	3053	Mitsubishi	Eclipse Turbo AWD ('99)	TTE*	3270
Mazda	RX-8 (212 hp)(Auto)('06-'07)	TTE*	3075	Mitsubishi	Galant 2.4L ('94-'03)	TTG*	2835
Mercedes	190E 2.3 (16v)	TTF**	3030	Mitsubishi	Galant 2.4L ('04-'07)	TTG	3428
Mercedes	190E 2.6L ('86-'93)	TTF**	2955	Mitsubishi	Galant 3.0L V6 (195hp)	TTF	3252
Mercedes	C230 ('02-'05)	TTF**	3305	Mitsubishi	Galant 3.8L (230 hp)('02-'07)	TTF*	3616
Mercedes	C230 ('06-'07)	TTF**	3405	Mitsubishi	Galant 3.8L Ralliart ('07)	TTF*	3748
Mercedes	C280 ('94-'00)	TTF**	3316	Mitsubishi	Galant VR4 (AWD) ('91-'92)	TTE	3275
Mercedes	C280 ('06-'07)	TTE	3460	Mitsubishi	Lancer 2.0L ('02-'07)	TTG	2745
Mercedes	C300 ('08)	TTE	3460	Mitsubishi	Lancer 2.0L DE, SE ('08)	TTG*	3000
Mercedes	C32 AMG ('02-'04)	TTC*	3540	Mitsubishi	Lancer 2.4L ('04-'07)	TTF*	2843
Mercedes	C320 ('01-'05)	TTE	3428	Mitsubishi	Lancer Evo VIII ('03-'05)(AWD)	TT1-4	
Mercedes	C43 AMG ('98-'00)	TTC	3450	Mitsubishi	Lancer Evo VIII MR ('05)(AWD)	TT1-4	
Mercedes	C55 AMG ('05-'06)	TT1-4		Mitsubishi	Lancer Evo IX ('06)(AWD)	TT1-4	
Mercedes	CL55 AMG (5.4L)('01-'02)	TTC	4100	Mitsubishi	Lancer Evo MR ('06)(AWD)	TT1-4	
Mercedes	CL65 AMG ('06)	TT1-4		Mitsubishi	Lancer Evo RS ('06)(AWD)	TT1-4	
Mercedes	CLK55 AMG ('04-'06)	TTC	3960	Mitsubishi	Lancer Evo X GSR ('08-'14)(AWD)	TT1-4	
Mercedes	CLK430 ('99-'01)	TTD*	3323	Mitsubishi	Lancer Evo X MR ('08-'14)(AWD)	TT1-4	
Mercedes	CLK430 ('02-'03)	TTD	3485	Mitsubishi	Lancer Ralliart ('09)	TTC	3450
Mercedes	CLK500 ('03-'06)	TTD*	3585	Mitsubishi	Mirage	TTG*	2183
Mercedes	CLK550 ('07)	TTC*	3965	Mitsubishi	Mirage 1.8L	TTF	2293
Mercedes	CLK63 AMG ('07)	TT1-4		Mitsubishi	Starion (turbo)	TTF**	2900
Mercedes	E55 AMG ('03-'06)	TT1-4		Mitsubishi	Starion ESI-R (turbo)	TTF**	3050
Mercedes	E55 AMG ('99-'02)	TTC*	3768	Nissan	200SX 1.6L	TTF	2325
Mercedes	E63 AMG ('07)	TT1-4		Nissan	200SX 2.0L ('80-'81)	TTG*	2500
Mercedes	SL55 AMG ('03-'06)	TT1-4		Nissan	200SX 2.0L Turbo	TTE	2800
Mercedes	SL55 AMG ('07)	TT1-4		Nissan	200SX SE-R (2.0L)	TTF	2565
Mercedes	SL65 AMG ('07)	TT1-4		Nissan	240SX	TTF**	2700
Mercedes	SLK 320 ('01-'04)	TTE*	3120	Nissan	240SX HICAS	TTE	2700
Mercedes	SLK32 AMG ('02-'04)	TT1-4		Nissan	240SX SOHC ('89-'90) (140hp)	TTF*	2684
Mercedes	SLK 350 ('05-'08)	TTC	3230	Nissan	240Z	TTE	2425
Mercedes	SLK55 AMG ('05-'07)	TT1-4		Nissan	260Z	TTF**	2660
Mercury	Capri 1.6L (75hp)	TTG	2135	Nissan	280Z	TTF**	2800
Mercury	Capri 2.0L ('71) (100hp)	TTF	2135	Nissan	280ZX	TTF**	2800

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Nissan	280ZX Turbo	TTE	2800	Peugeot	505 Turbo 2.2L ('88-'89)(180hp)	TTF**	2950
Nissan	300ZX all (Z31--'84-'88) NA	TTE	2668	Plymouth	Laser Turbo ('90-'94)	TTE	2756
Nissan	300ZX Turbo (Z31--'84-'89)	TTE	3260	Plymouth	Laser Turbo AWD ('92-'94)	TTE*	3073
Nissan	300ZX NA (Z32) 2+2	TTE	3414	Plymouth	Prowler	TTD*	2857
Nissan	300ZX NA (Z32--'89-'96)	TTE*	3174	Pontiac	Fiero (4-cyl)	TTG	2590
Nissan	300ZX TT	TTD**	3480	Pontiac	Fiero (V6)	TTF*	2778
Nissan	350Z (287hp)('03-'05)(enth. ok)	TTC	3188	Pontiac	Firebird 3.4L (V6)	TTG*	3306
Nissan	350Z (300hp)('06)(enth. ok)	TTC	3339	Pontiac	Firebird 3.8L	TTF*	3306
Nissan	350Z (306hp)('07-'08)(enth. ok)	TTC*	3320	Pontiac	Firebird Firehawk	TT1-4	
Nissan	350Z Nismo ('07-'08)	TT1-4		Pontiac	Firebird WS6	TTC*	3450
Nissan	350Z Roadster ('06)	TTD*	3602	Pontiac	Formula ('98-'02)	TTC	3452
Nissan	350Z Track ('05-'06),35ann, GT	TTC*	3370	Pontiac	Formula (pre-'98)	TTD	3408
Nissan	350Z Track Model ('03-'04)	TTC*	3225	Pontiac	Formula '87 (5.0L, 215hp)	TTF**	3383
Nissan	370Z ('09)(6 sp. manual)	TT1-4		Pontiac	Grand AM 2.3L (170,180hp)	TTF**	2852
Nissan	370Z Sport Model ('09)	TT1-4		Pontiac	Grand Am 3.4L (V6)	TTG**	3091
Nissan	370Z Nismo ('09)	TT1-4		Pontiac	Grand Prix GT 3.8L ('98-'04)	TTF	3484
Nissan	Altima 2.4L	TTF	2853	Pontiac	Grand Prix GT 3.8L ('05-'06)	TTE	3484
Nissan	Altima 2.5L ('02-'09)	TTF*	2992	Pontiac	Grand Prix GTP ('99-'03)	TTF*	3464
Nissan	Altima 3.5L ('02-'06)	TTE*	3225	Pontiac	Grand Prix GTP ('04-'06)	TTE	3583
Nissan	Altima 3.5L ('07-'08)	TTE**	3268	Pontiac	Grand Prix GXP ('05-'08)	TTE**	3600
Nissan	Altima 3.5L SE-R ('05-'06)	TTD	3279	Pontiac	Grand Prix SE 3.1L	TTG*	3384
Nissan	GT-R ('09+)	TT1-4		Pontiac	GTO ('04)	TTD*	3725
Nissan	Juke 1.6L (turbo) ('11-'15)	TTF**	3000	Pontiac	GTO ('05-'06)	TTC*	3725
Nissan	Juke 1.6L (turbo)(AWD) ('11-'15)	TTF**	3160	Pontiac	Solstice ('06-'08)	TTE	2860
Nissan	Maxima 3.5L ('02-'03)	TTE*	3239	Pontiac	Solstice GXP (turbo)('07-'08)	TTC	2988
Nissan	Maxima 3.5L ('04-'06)	TTE*	3471	Pontiac	Trans Am ('98-'02)	TTC	3450
Nissan	Maxima 3.5L ('07-'08)	TTE	3591	Pontiac	Trans Am (pre-'98)	TTD	3410
Nissan	Maxima SE 3.0L ('00-'01)	TTE	3150	Pontiac	Trans Am Turbo V6	TTC	3346
Nissan	NX2000	TTF	2520	Pontiac	Vibe 1.8L ('03-'07)	TTG*	2700
Nissan	Pickup ('90-'97)(2WD)	TTG**	2800	Pontiac	Vibe GT ('04-'06)	TTF	2780
Nissan	Pulsar NX 1.8L	TTF	2566	Pontiac	Vibe GT ('03)	TTF*	2780
Nissan	Sentra 1.6L ('87-'88)(8v)(69hp)	TTG	2250	Porsche	911 ('63-'69)	TTE*	2248
Nissan	Sentra 1.6L (16v)	TTF	2299	Porsche	911 ('70-'73)	TTE*	2375
Nissan	Sentra 1.8L ('00-'06)	TTG*	2590	Porsche	911 ('73-'77)	TTE*	2469
Nissan	Sentra 2.0L ('07-'08)	TTG**	2853	Porsche	911 ('78-'83)	TTE**	2552
Nissan	Sentra SE ('98-'01)	TTF	2617	Porsche	911 ('84-'89)	TTD*	2756
Nissan	Sentra SE-R 2.0L ('91-'94)	TTF	2520	Porsche	911 Carrera ('73-'77)	TTD*	2469
Nissan	Sentra SE-R 2.5L ('02-'06)	TTF*	2800	Porsche	911 Turbo 3.0L ('74-'77)	TT1-4	
Nissan	Sentra SE-R 2.5L ('07-'08)	TTF	3102	Porsche	911 Turbo 3.3L ('77-'89)	TT1-4	
Nissan	Sentra Spec V ('02-'06)	TTF**	2710	Porsche	911S ('67-'69)	TTD	2248
Nissan	Sentra Spec V ('07-'08)	TTF**	3078	Porsche	911S ('70-'73)	TTD*	2374
Nissan	Versa 1.6L ('09-'15)	TTG**	2360	Porsche	912	TTF**	2095
Nissan	Versa 1.8L ('07-'12)	TTG**	2700	Porsche	914-4	TTF**	2138
Nissan	Versa Note 1.6L ('14-'15)	TTG**	2360	Porsche	914-6	TTE	2070
Noble	M12 GTO-3R (352 hp 3.0L V6)	TT1-4		Porsche	924 ('77-'79)	TTG**	2635
Noble	M400 (425 hp 3.0L V6)	TT1-4		Porsche	924S ('87)	TTF**	2734
Oldsmobile	Cutlass Calais 2.3L Int. (150hp)	TTF	2700	Porsche	924S ('88)	TTE	2734
Oldsmobile	Cutlass Calais 2.3L Int. (180hp)	TTF**	2730	Porsche	924 Turbo	TTE*	2601
Oldsmobile	Cutlass Calais 2.3L Quad442	TTF**	2730	Porsche	928 ('78-'82)(4.5L)	TTD	3200
Oldsmobile	Cutlass Calais Quad442 W41	TTE*	2625	Porsche	944 ('83-'87)	TTF**	2779
Opel	GT 1100	TTG	1918	Porsche	944 2.5L ('88)	TTF**	2844
Opel	GT1900	TTG*	2138	Porsche	944 2.7L ('89)(162 hp)	TTF**	2866
Opel	Manta	TTG	2230	Porsche	944 S	TTE*	2975
Peugeot	505 Turbo 2.2L ('86-'88)(150hp)	TTF*	2850	Porsche	944 S2	TTD*	2892

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Porsche	944 Turbo ('86-'88)	TTD*	2899	Porsche	Cayman 2.9L ('09-'12)	TT1-4	
Porsche	944 Turbo S ('88-'89)	TTC	2998	Porsche	Cayman S 3.4L ('06-'08)	TT1-4	
Porsche	959	TT1-4		Porsche	Cayman S 3.4L ('09-'12)	TT1-4	
Porsche	964 Carrera 2	TTD**	2970	Porsche	Cayman S 3.4L ('14)	TT1-4	
Porsche	964 Carrera 4 (AWD)	TTD**	3190	Porsche	Cayman R 3.4L ('11-'12)	TT1-4	
Porsche	964 RS	TT1-4		Renault	Alliance 1.4L (60hp)	TTG	2030
Porsche	964 RS America	TTC*	2820	Renault	Alliance 1.7L (85hp)	TTG*	2030
Porsche	965 3.3L (Turbo II--'90-'92)	TT1-4		Renault	Alliance 2.0L GTA (95hp)	TTG**	2161
Porsche	965 3.6L (Turbo II--'93-'94)	TT1-4		Rosion	Q1	TT1-4	
Porsche	968	TTD*	2910	Saab	900 Turbo SPG ('85-'89)	TTF**	2875
Porsche	968 Turbo S	TT1-4		Saab	900 Turbo SPG ('90-'91)	TTF**	2900
Porsche	993 C2 ('94-'95)	TTC*	3064	Saab	9000 Aero 2.3L Turbo ('93-'97)	TTE	3265
Porsche	993 C2 ('96-'99)	TT1-4		Saab	9-2X Aero ('05)(AWD)	TTD	3179
Porsche	993 C2S	TT1-4		Saab	9-2X Aero ('06)(AWD)	TTD*	3208
Porsche	993 C4 (AWD)	TT1-4		Saab	9-2X Linear ('05-'06)(AWD)	TTE	3030
Porsche	993 C4S (AWD)	TT1-4		Saab	9-3 2.0T ('99-'01)(turbo)	TTF**	2990
Porsche	993 Cup	TT1-4		Saab	9-3 Aero 2.0T & 2.0T ('04-'07)	TTF**	3175
Porsche	993 RS 3.8L	TT1-4		Saab	9-3 Aero 2.8L ('06-'07)	TTE**	3285
Porsche	993 Turbo (AWD)	TT1-4		Saab	9-3 Viggen ('99-'02)	TTE*	3170
Porsche	993 Turbo S (AWD)	TT1-4		Saab	9-5 2.3T	TTE*	3470
Porsche	996 C2 (3.4L) ('99-'01)	TT1-4		Saab	9-5 Aero 2.3T & 2.3T ('02-'06)	TTE	3470
Porsche	996 C2 (3.6L)('02-'04)	TT1-4		Saab	99 EMS ('72-'76)(2.0L)	TTG*	2560
Porsche	996 C4 (3.4L)	TT1-4		Saturn	Ion ('03-'04)	TTF	2653
Porsche	996 C4 (3.6L)	TT1-4		Saturn	Ion ('05-'07)	TTG**	2766
Porsche	996 C4S (3.6L)	TT1-4		Saturn	Ion Redline ('04-'07)	TTE*	2945
Porsche	996 GT2	TT1-4		Saturn	Sky ('07-'08)	TTF**	2933
Porsche	996 GT3	TT1-4		Saturn	Sky Redline ('07-'08)	TTC	2990
Porsche	996 Cup	TT1-4		Saturn	S-Series (DOHC) ('91-'02)	TTF	2437
Porsche	996 Turbo	TT1-4		Saturn	S-Series (SOHC) ('91-'02)	TTG*	2345
Porsche	996 Turbo S	TT1-4		Scion	tC ('05-'10)	TTF	2905
Porsche	997 C4 ('06-'07)	TT1-4		Scion	tC ('11)	TTF**	3030
Porsche	997 C4S ('06-'07)	TT1-4		Scion	xA ('04-'06)	TTG*	2340
Porsche	997 Carrera ('05-'07)	TT1-4		Scion	xB ('04-'06)	TTG	2415
Porsche	997 Club Coupe	TT1-4		Scion	FR-S Coupe ('13-'16)	TTD	2940
Porsche	997 CS ('05-'07)	TT1-4		Subaru	BRZ Coupe ('13-'16)	TTD	2940
Porsche	997 GT3 ('07)	TT1-4		Subaru	Forester XT ('04-'05) (AWD)	TTF**	3225
Porsche	997 GT3 Cup	TT1-4		Subaru	Forester XT ('06-'07) (AWD)	TTE	3270
Porsche	997 Turbo AWD ('07)	TT1-4		Subaru	Impreza 1.8L (AWD)	TTG**	2605
Porsche	Boxster ('97-'99)	TTE*	2822	Subaru	Impreza 1.8L (FWD)	TTG**	2325
Porsche	Boxster ('00-'02)	TTE**	2900	Subaru	Impreza 2.2L (AWD)	TTF**	2730
Porsche	Boxster ('02-'04)	TTD	2920	Subaru	Impreza 2.5L ('98-'01)(AWD)	TTE	2840
Porsche	Boxster ('05-'06)	TTD*	2855	Subaru	Impreza 2.5L ('02-'05)(AWD)	TTF**	2972
Porsche	Boxster ('07-'08)	TTD**	2855	Subaru	Impreza 2.5L ('06-'08)(AWD)	TTE	3016
Porsche	Boxster ('09-'10)	TTC	2880	Subaru	Legacy 2.2L ('90-'94)(AWD)	TTF	2830
Porsche	Boxster S ('05-'06)	TTC*	2965	Subaru	Legacy 2.2L ('95-'99)(AWD)	TTF*	2885
Porsche	Boxster S ('00-'02)	TTD**	2950	Subaru	Legacy 2.2L T AWD ('91-'94)	TTF*	3100
Porsche	Boxster S ('03-'04)	TTC	2911	Subaru	Legacy 2.5L ('00-'08)(AWD)	TTF**	3200
Porsche	Boxster S ('07-'08)	TT1-4		Subaru	Legacy GT ('05-'08)(AWD)(Turb)	TTD*	3300
Porsche	Boxster S ('09-'10)	TT1-4		Subaru	Legacy 3.0 AWD ('08)	TTE	3545
Porsche	Boxster Spyder ('11)	TT1-4		Subaru	Outback 3.0 ('01-'04)(AWD)	TTF*	3630
Porsche	Carrera GT	TT1-4		Subaru	Outback 3.0 ('05-'07)(AWD)	TTE	3610
Porsche	Cayenne S ('03-'06)(AWD)	TTF*	4950	Subaru	Outback XT ('05-'06)(AWD)	TTE*	3415
Porsche	Cayenne Turbo ('08)(AWD)	TTC	5191	Subaru	Outback XT ('07)(AWD)	TTE	3535
Porsche	Cayman 2.7L ('07-'08)	TTC	2900	Subaru	SVX (AWD)	TTE	3375

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Subaru	WRX 2.0L ('02-'05) (AWD)	TTD	3085	Toyota	Supra NA ('94-'98)	TTE*	3265
Subaru	WRX 2.0L ('15)(AWD)	TT1-4		Toyota	Supra T	TTE	3534
Subaru	WRX 2.5L ('06-'08)(AWD)	TTD*	3140	Toyota	Supra TT	TT1-4	
Subaru	WRX 2.5L ('09-'14)(AWD)	TT1-4		Toyota	Tacoma X-Runner ('05-'10)	TTF	3805
Subaru	WRX ST1-4i ('04-'07)(AWD)	TT1-4		Toyota	Tercel ('88-'90) (78hp)	TTG	2020
Subaru	WRX STI ('08-'14)(AWD)	TT1-4		Toyota	Yaris ('07-'11)	TTG**	2280
Subaru	XT	TTG*	2455	Toyota	Yaris ('12)	TTG**	2280
Subaru	XT6 (AWD)	TTF*	2885	Triumph	GT6 MK I	TTF**	1905
Subaru	XV Crosstrek ('13-'15)(AWD)	TTF	3100	Triumph	GT6 MK III	TTE	1904
Sunbeam	Tiger	TTE*	2575	Triumph	Spitfire MK 2 (75hp, 1147cc)	TTF*	1564
Suzuki	Swift ('94-'01)	TTG*	1930	Triumph	TR4 ('61-'64)	TTF*	2240
Suzuki	Swift 1.3L GT ('89-'94)	TTF*	1900	Triumph	TR6 ('69-'76)(2.5L S6 US Carb)	TTF*	2360
Suzuki	SX4 Sport ('08-'09)	TTF	2665	Triumph	TR6 ('69-'76)(2.5L S6 Fuel Inj)	TTD	2360
Suzuki	SX4 Sport ('10)	TTF	2750	Volvo	242 (2.3L) ('83-'85)	TTG	2840
Toyota	Camry 2.4L ('02-'06)	TTG*	3086	Volvo	242 GLT ('81-'85)(turbo)	TTF	3072
Toyota	Camry 2.4L ('07-'08)	TTG	3263	Volvo	850 2.4L n.a. ('93-'97)	TTF	3180
Toyota	Camry 3.0L (V6)('97-'01)	TTF	3240	Volvo	850 T-5R ('95), R ('96-'97)	TTE*	3240
Toyota	Camry 3.0L (V6)('03-'05)	TTF*	3296	Volvo	C30 T5 2.5L turbo ('08)	TTE**	2970
Toyota	Camry 3.3L (V6)('04-'05)	TTF*	3351	Volvo	C70 T5 2.3 T Coupe ('98)	TTE*	3300
Toyota	Camry 3.3L (V6)('06)	TTF	3450	Volvo	C70 T5 2.3 T Coupe ('01-'02)	TTE*	3325
Toyota	Camry 3.5L (V6)('07-'08)	TTE*	3461	Volvo	C70 T5 2.3 T Conv. ('99-'04)	TTE	3450
Toyota	Celica AllTrac ('88-'89)	TTE	3270	Volvo	C70 T5 ('06-'07)	TTF	3772
Toyota	Celica AllTrac ('90-'93)	TTE	3272	Volvo	P1800 ('61-'62)	TTF	2215
Toyota	Celica GT ('00-'05)	TTF**	2425	Volvo	S40 1.9 L ('00-'04)	TTF**	2767
Toyota	Celica GT ('77-'82)	TTG**	2460	Volvo	S40 2.4L ('04-'06)	TTF	3084
Toyota	Celica GT ('83-'86)	TTG*	2500	Volvo	S40 2.4L ('07)	TTG**	3234
Toyota	Celica GT ('87-'89)	TTG**	2455	Volvo	S40 T5 ('05)	TTE	3126
Toyota	Celica GT ('90-'99)	TTF	2600	Volvo	S40 T5 ('06-'07)	TTF**	3278
Toyota	Celica GT-S ('00-'05)	TTE*	2500	Volvo	S40 T5 ('05-'07)(AWD)	TTE*	3447
Toyota	Celica GT-S ('83-'85)	TTG	2566	Volvo	S60 2.4L	TTF	3230
Toyota	Celica GT-S ('86-'93)	TTF	2679	Volvo	S60 2.5L Turbo ('04-'06)(AWD)	TTE	3603
Toyota	Celica ST ('90-'93)	TTG	2600	Volvo	S60 2.5L Turbo ('07)(AWD)	TTF**	3651
Toyota	Celica Supra (1st gen)	TTF**	2789	Volvo	S60 2.5L Turbo ('04-'06)(FWD)	TTF**	3393
Toyota	Corolla 1.8L ('03-'07)	TTF	2530	Volvo	S60 2.5L Turbo ('07)(FWD)	TTF*	3501
Toyota	Corolla FX-16 GT-S	TTF	2390	Volvo	S60 R ('04-'05)(AWD)	TTD*	3715
Toyota	Corolla GT-S 1.6L 16v ('84-'87)	TTF**	2200	Volvo	S60 R ('06-'07)(AWD)	TTD*	3715
Toyota	Corolla GT-S 1.6L 16v ('88-'89)	TTF	2390	Volvo	S60 2.4L T5 ('05-'07)	TTE**	3393
Toyota	Corolla SR5 ('79-'83)(3TC)	TTG	2185	Volvo	S60 2.3L T5 ('01-'04)	TTE*	3406
Toyota	Corolla XRS	TTF**	2670	Volvo	S60 3.0L T6 R ('13-'14)(AWD-T)	TTD**	3850
Toyota	Echo	TTF**	2035	VW	Beetle 1.8L T (150hp)('99-'05)	TTF	2820
Toyota	Matrix ('03-'08)	TTG*	2673	VW	Beetle 1.9L TDI ('98-'03)	TTH**	2750
Toyota	Matrix ('09-'14)	TTG*	2770	VW	Beetle 1.9L TDI ('04-'06)	TTH**	2850
Toyota	Matrix XRS (180 hp)('03-'04)	TTF*	2800	VW	Beetle 2.0L ('98-'05)	TTH**	2743
Toyota	Matrix XRS ('05-'06)	TTF	2800	VW	Beetle 2.0L Turbo ('12-'15)	TTE*	3020
Toyota	MR Spyder	TTE*	2195	VW	Beetle 2.5L ('06-'08)	TTG**	2884
Toyota	MR2 (1st Gen NA)	TTF*	2380	VW	Beetle Turbo S ('02-'04)	TTF*	3005
Toyota	MR2 2.2L DOHC	TTF*	2657	VW	Corrado 1.8L DOHC, 2.0L DOHC	TTF**	2403
Toyota	MR2 SC	TTF**	2605	VW	Corrado 2.0L SOHC	TTG**	2418
Toyota	MR2 Turbo	TTE**	2825	VW	Corrado G60 1.8L S/C	TTE*	2558
Toyota	Paseo	TTG**	2025	VW	Corrado VR6	TTF**	2733
Toyota	Prius	TTH	2932	VW	Golf 1.6L, 1.8L	TTG*	2120
Toyota	Solara 3.3L ('04-'06)	TTF*	3419	VW	Golf 1.8L DOHC, 2.0L DOHC	TTF	2672
Toyota	Solara 3.3L ('07-'08)	TTF	3440	VW	Golf 1.9L TDI ('99-'03)	TTH**	2750
Toyota	Supra NA ('88-'92)	TTF**	3430	VW	Golf 1.9L TDI ('04-'06)	TTH**	2850

<u>Make</u>	<u>Model</u>	<u>Class</u>	<u>Wt.</u>	<u>Make</u>	<u>Model</u>	<u>Class</u>	<u>Wt.</u>
VW	Golf 2.0L TDI ('10-'14)	TTF*	3000	VW	Jetta 2.0L GLi DOHC	TTF*	2438
VW	Golf 2.0L TDI ('15)	TTF*	3080	VW	Jetta 2.0L SOHC	TTH	2934
VW	Golf 2.0L, 1.4L & 1.6L DOHC	TTG*	2533	VW	Jetta 2.0L turbo ('06-'08)	TTF*	3259
VW	Golf 2.0L ('99-'06)	TTH**	2771	VW	Jetta 2.0L turbo GLI ('12-'15)	TTE*	3160
VW	Golf 2.5L I5	TTF*	2732	VW	Jetta 2.5L I5 ('05-'07)	TTG	3230
VW	Golf 2.8L V6	TTF*	3102	VW	Jetta 2.5L I5 ('08)	TTG**	3230
VW	Golf 2.8L VR6	TTE	2546	VW	Jetta 2.8L VR6 12v ('94-'98)	TTF	2927
VW	Golf R 2.0L Turbo ('12-'13)	TTD**	3300	VW	Jetta 2.8L VR6 12v ('99-'02)	TTG**	3113
VW	Golf R 2.0L Turbo ('15)	TT1-4		VW	Jetta 2.8L VR6 24v	TTF*	3179
VW	Golf R32 (AWD)('04)	TTD	3350	VW	Passat 1.8L turbo ('14-'16)	TTF*	3150
VW	Golf R32 (AWD)('08)	TTE*	3600	VW	Passat 2.0L turbo ('06-'08)	TTF*	3305
VW	GTI 1.8L 8v ('85-'92)	TTG*	2267	VW	Passat 2.0L TDI ('12-'16)	TTG**	3360
VW	GTI 1.8L DOHC	TTF*	2267	VW	Passat 2.5L ('12-'13)	TTF	3150
VW	GTI 1.8L turbo (150 hp)	TTF	2762	VW	Passat 2.8L	TTF*	3151
VW	GTI 1.8L turbo (180hp)	TTF*	2934	VW	Passat 3.6L ('06-'08)	TTE*	3576
VW	GTI 2.0L 8v ('95-'98)	TTG*	2557	VW	Passat 3.6L ('12-'14)	TTE**	3400
VW	GTI 2.0L 8v ('99-'00)	TTH**	2765	VW	Passat 3.6L ('06-'08)(AWD)	TTE*	3700
VW	GTI 2.0L DOHC (134 hp)	TTF*	2445	VW	Passat W8 (AWD)	TTE	3918
VW	GTI 2.0L Turbo ('06-'09)(200hp)	TTF**	3100	VW	Rabbit 1.6L	TTH**	2000
VW	GTI 2.0L Turbo ('10-'14)(200hp)	TTE*	3020	VW	Rabbit 1.6L Diesel (<'92)	TTH*	2270
VW	GTI 2.0L Turbo ('15)(210hp)	TTE**	3000	VW	Rabbit 1.6L Turbo-Diesel (<'93)	TTH*	2300
VW	GTI 2.8L V6 (174hp)	TTF	3011	VW	Rabbit 1.7L (74hp)	TTH**	2046
VW	GTI 2.8L V6 (200hp)	TTF**	3036	VW	Rabbit 2.5L ('06-'07)	TTG**	2975
VW	GTI 337 (turbo)	TTF**	2857	VW	Rabbit 2.5L ('08-'09)	TTF	2975
VW	Jetta 1.6L	TTH**	2040	VW	Rabbit GTI 1.8L (90hp)	TTG*	2120
VW	Jetta 1.8L DOHC	TTF*	2305	VW	Scirocco 1.6L (75-78hp)	TTH**	2015
VW	Jetta 1.8L SOHC	TTG	2450	VW	Scirocco 1.7L (74hp)	TTH**	2040
VW	Jetta 1.8L turbo GLI	TTF	3106	VW	Scirocco 1.8L DOHC	TTF*	2287
VW	Jetta 1.9L TDI ('04-'06)	TTH**	2950	VW	Scirocco 1.8L SOHC	TTG*	2120

### 8.3 Up-Classing System (TTC-TTF only)

#### Modifications and Point Assessments:

If a car accrues 20 or more points it will be bumped up in Class. There is no limit—a car with a high level of modifications might move up several Classes.

20 thru 39 points - Up ONE Class

40 thru 59 points - Up TWO Classes

60 thru 79 points - Up THREE Classes

80 thru 99 points - Up FOUR Classes

100 thru 119 points - Up FIVE Classes

**One (1) asterisk \* on a base class assignment denotes a 7 point initial assessment, and two (2) asterisks \*\* denotes a 14 point initial assessment that is added to the total number of Modification Points to determine the final competition class.**

**FORCED INDUCTION VEHICLES will add an additional five (+5) points to the total number of Modification Points to determine the final competition class. (Forced induction vehicles that have been classed or re-classed by the National TT Director based on Dyno testing are exempt from this additional five (+5) point assessment.)**

**All factory options and other modifications by the factory that are not included in the base trim model (BTM) of the Vehicle Model Group must be assessed points.** In general, if a BTM item is either removed or re-located, it shall be considered to have been “modified”.

#### **A. TIRES:**

- 1) The following DOT-approved R-compound tires: BFG R1S, Goodyear Eagle RS AC (auto-cross), Hoosier A7, Hankook Z214 (C90 & C91 compounds only), Hoosier Wet DOT (if used in dry conditions—see section 5.6) +22
- 2) The following DOT-approved R-compound tires: Hoosier A6 +17
- 3) The following DOT-approved R-compound tires and those with a UTQG treadwear rating of 40 or less not listed otherwise in these rules: BFG R1, Goodyear Eagle RS, Hankook Z214 (C71, C70, C51, C50), Hoosier R7, Kumho V710 +10
- 4) The following DOT-approved R-compound tires: Hoosier SM7 +9
- 5) The following DOT-approved R-compound tires: Hoosier R6, Hoosier SM6 (note: Continental Tire Sportscar Challenge EC-Dry tires (225, 245, 275) OK) +8
- 6) The following DOT-approved R-compound tires: Toyo Proxes RR, Hankook TD, Pirelli Trofeo R +5
- 7) The following DOT-approved tires and those R-compound tires with a UTQG treadwear rating over 40: BFG Rival S, Bridgestone RE071-R, Maxxis RC-1 (examples: Kumho V700, Kumho V720, Michelin Pilot Sport Cup & MPS Cup 2, Nitto NT01, Pirelli PZero Corsa, Toyo R888, Toyo RA-1, Yokohama A048, etc.) +4
- 8) DOT-approved (non-R-compound) tires with a UTQG treadwear rating of 120-200 (examples: BFG g-Force Rival, Toyo R1R, Dunlop Direzza Sport Z1 Star Spec, Bridgestone Potenza RE070, Kumho Ecsta XS, Yokohama Advan A046 & Neova AD08, Hankook R-S3) +2
- ~~9) Non-DOT approved racing slicks +30 (of any origin—re-caps and re-treads are not permitted)~~
- 10) The following tire sizes will be used as the base tire size for each **Base Class** for all vehicles regardless of their OEM tire size(s) or their Final Competition Class. All

vehicles in a given base class may use this tire size (or smaller) without a points assessment:

~~TTB: 265mm~~, TTC: 255mm, TTD: 245mm, TTE: 235mm, TTF: 215mm,  
TTG: 195mm, TTH: 175mm

Tire width points assessed or points credited are determined by the difference between the width of the **largest tire** on the vehicle and the assigned base tire size as follows:

Equal to or greater than: 10mm +1, 20mm +4, 30mm +7, 40mm +10, 50mm +13,  
60mm +16, 70mm +19, 80mm +22, 90mm +25, 100mm +28, 110mm +31

Equal to or less than: -10mm -1, -20mm -4, -30mm -7

Tire width is determined by the number printed on the tire sidewall by the manufacturer, unless stated otherwise in these rules. If a tire does not have a manufacturer's printed number on the sidewall, then actual tread width measurement (not contact patch) will be used. UTQG tread wear ratings are as of the date of the current version of the TT rules. Any new tire or tire with a changed UTQG tread wear rating must be evaluated by the National TT Director before the rating will be legal for use in NASA TT classing. All DOT-approved tires must be available for purchase by the general public through Federal or state licensed tire dealers. Tire treatments and softeners are not permitted.

Exception(s) to A.8): The Hoosier 255/35-18 (A6 & R6 only) will be assessed points based on its actual 275mm size (and not the 255mm listed on the sidewall)

## **B. WEIGHT REDUCTION:**

Weight reduction points are based on the actual vehicle Minimum Competition Weight (with driver). Removal and lightening of non-essential parts is permitted unless stated otherwise in these rules. Modification of the OEM frame, sub-frame, and floor pan are not permitted (see 8.2.2). Removal or lightening of engine parts is permitted only as listed elsewhere in these rules. The exterior surface of the roof, hood, body panels, and doors must maintain their BTM size and shape unless listed otherwise in these rules.

If the base weight used for base classing purposes (above in 8.2.2) minus minimum competition weight (with driver\*) is greater than: 5 lbs +1, 20 lbs +2, 35 lbs +3, 50 lbs +4, 65 lbs +5, 80 lbs +6, 95 lbs +7, 110 lbs +8, 125 lbs +9, 140 lbs +10, 155 lbs +11, 170 lbs +12, 185 lbs +13, 200 lbs +14, 215 lbs +15, 230 lbs +16, 245 lbs +17, 260 lbs +18, 275 lbs +19, 290 lbs +20, 305 lbs +21, 320 lbs +22, 335 lbs +23, 350 lbs +24, 365 lbs +25, 380 lbs +26, 395 lbs +27, 410 lbs +28, 425 lbs +29, 440 lbs +30, 455 lbs +31, 470 lbs +32, 485 lbs +33, 500 lbs +34, 515 lbs +35, etc...

\*Minimum Competition Weight is the vehicle's lightest weight with the driver and safety gear, during any competition session. Any driver/team whose vehicle at impound does not meet the minimum weight that they have declared on their Car Classification Form will be disqualified if the number of Modification Points based on the lighter actual weight puts the car in a higher competition class. As well, additional penalties may be assessed (sections 8.4.3 and 14) for failing to meet the listed weight on the Car Classification Form.

### C. ENGINE:

- 1) Engine swap: All engine swaps must be evaluated for new base classification by the National TT Director on an individual basis. Competitors must submit an e-mail request for re-classification of the vehicle. A printed copy of the Official Re-Class e-mail from the National TT Director must be attached to the TT Car Classification Form. Almost all engine swaps will require chassis Dyno testing of the competition-ready vehicle (See section 8.4 for Dyno Re-classing, Testing, and Re-class request procedures).
- 2) Increased number of camshafts, non-BTM (non-stock) head(s)/hybrids, port modified rotary engines, and non-BTM/upgraded/modified turbo or superchargers all require Dyno Re-classing by the National TT Director. A printed copy of the Official Re-Class e-mail from the National TT Director must be attached to the TT Car Classification Form. (See section 8.4 for Dyno Re-classing, Testing, and Re-class request procedures). This includes all OEM/BTM forced induction vehicles with an upgraded or modified turbo or supercharger. After re-classification, Modification Points will not be assessed for weight reduction or engine. However, if the power output of the vehicle is later increased, the participant will have to get the vehicle Re-classed again.
- 3) Aftermarket computer system (any non-BTM “stand-alone” or “piggyback”):  
+3 naturally aspirated, +10 forced induction
- 4) Modification of the BTM air intake/box, air filter location, air piping to the turbo/supercharger/intercooler/throttle body/carburetor, or hood/fascia/fender air inlet(s), outlets, or vents +1 (air filter upgrade alone—0 pts.)
- 5) Non-BTM, deleted, or modified/porting throttle body +2; independent throttle bodies +4
- 6) Non-BTM or modified carburetor, fuel rail, fuel injectors, fuel pump(s), and/or fuel pressure regulator +2 (no points for fuel pump alone if using BTM fuel and timing maps, sensor inputs and ignition timing)
- 7) Non-BTM, modified/porting, or deleted intake manifold: 4 cyl. +1, 6cyl. +2, 8 cyl. +3, 12A & 13B rotary +2, all other rotary +3
- 8) Water injection system +6 (alcohol-water mixtures are not permitted)
- 9) Nitrous oxide injection is not permitted.
- 10) Replacement pulleys (other than for supercharger) or non-electrical fan removal +1
- 11) Replacement pulley for BTM supercharger or replacement of any pulley that affects BTM supercharger speed +4
- 12) Aftermarket boost controller or modification/alteration of BTM vacuum lines that serve to function as a boost controller +4
- 13) Aftermarket or modified wastegate actuator, wastegate, or vacuum line(s) that serve to control the wastegate actuator function or increase peak boost +3
- 14) Add aftermarket intercooler +7
- 15) Non-BTM or modified intercooler +4 (Intercooler sprayers are not permitted unless they came on the OEM base trim model of the vehicle).
- 16) Increased displacement by: <1.5% +0, 1.5% to <5.5% +4, 5.5% to <7% +6, 7% to <10% +8, 10% to <15% +10, 15% to <20% +15, >20% +20.  
Formula to calculate % = current disp. divided by OEM disp., minus 1, x 100 = %  
Example: 1852cc/1799cc = 1.029 minus 1 = .029 x 100 = 2.9% (+4 pts.)
- 17) Modified or non-BTM camshaft(s), rocker arms, push rods, lifters, or cam timing gears +6 (for one or more)
- 18) Valve size change, modified, ported or polished BTM head (other than simple shaving of the head only) +6



- 19) Any modifications that result in increased engine compression ratio (including shaving the head or decking the block to factory specs):  
0.50 or less +0, >0.50 +3, >1.0 +6, >2.0 +10, >3.0 +15
- 20) De-stroked engine +4
- 21) Added dry sump oil system +7 (+14 if motor is lowered from BTM location)
- 22) Modification, porting, or replacement of the BMT exhaust manifold or header(s) (includes any/all other exhaust and catalytic converter modifications) +5
- 23) Any modification to the BTM exhaust piping and/or catalytic converter (includes muffler modification or replacement) +3
- 24) Non-BTM or modified resonator(s) or muffler(s) only (no exhaust piping modifications) +1

#### **D. DRIVETRAIN:**

- 1) Non-BTM sequential (semi-automatic) or dog-ring (non-synchromesh) transmission (includes altered gear ratios) +7 (does not include automatic transmissions utilizing a torque converter)
- 2) Double clutch transmissions with altered gear ratios +6 (do not also assess D.3 & D.4)
- 3) Modify number of forward gears in transmission or altered gear ratios +3
- 4) Added paddle/electronic shift +3
- 5) Added limited slip differential or welded/locked differential +3
- 6) Changed or modified limited slip differential (or welded/locked BTM LSD) +1
- 7) Added traction control +3 (no points if proven disabled during competition)
- 8) Relocation of engine/transmission between 1 and 10 inches of the BTM location +7 (note: Relocation of less than 1 inch is not assessed points. Original engine location shall be based on the BTM rear face of the engine block and the BTM crankshaft centerline.)
- 9) Modification/upgrade from a fixed to a floating rear axle +3

#### **E. SUSPENSION:**

- 1) Non-BTM shocks/struts/dampers with an external reservoir or more than two ranges of adjustment—must still take points for springs below +8 (example: compression (bump) and both high & low rebound adjustments) (May have spherical tops and/or bottoms)
- 2) Non-BTM shocks/struts/dampers with a “Piggy Back” external reservoir (fixed reservoir without a connecting hose) OR with shaft diameter 40mm or greater—must still take additional points for the springs below +5 (May have spherical tops and/or bottoms)
- 3) Non-BTM or modified/re-valved shocks/struts/dampers +3 (all others)(springs not included) (May have spherical tops and/or bottoms)
- 4) Changing the mounting orientation/design of the BTM shock and/or spring perch in order to invert the front shocks/struts (includes non-BTM inverted shocks/struts) +1
- 5) Non-BTM or modified coil springs, bump stops, leaf springs/spacers/brackets, or torsion bars +2
- 6) Conversion of torsion bar/leaf spring suspension to coil spring and strut/shock suspension +2
- 7) Add, replace, remove, or modify anti-roll bars (“sway” bars—front, rear, or both) or end links—may have spherical joints on the end links and/or relocation of the mounting points without additional points assessment +2
- 8) Non-BTM driver/cockpit adjustable sway bar or suspension settings +4
- 9) Replace, modify, or remove control arms (including toe arms/links) (other than plates, shims,

- or eccentric bolts/bushings for simple camber/caster adjustment only) or RWD/AWD rear trailing arms (may have spherical/metallic joint for the connection to the spindle/knuckle) +4
- 10) Non-BTM rear control arms on FWD vehicles (for stiffness and wheel alignment only, no change in suspension mount or pick-up points from stock) +1 (if both front and rear use E.9)
  - 11) Non-BTM rear trailing arms on FWD vehicles (for stiffness only, no change in suspension mount or pick-up points from stock) +1
  - 12) Using the alternate control arm mounting location on cars equipped BTM with multiple choices (example: to increase track width) +6
  - 13) Relocation of front suspension mounting points +6 (includes modifications to spindles and knuckles that relocate control arm mounting points in space—such as “drop spindles”)
  - 14) Relocation of rear suspension mounting points +6 (includes modifications to spindles and knuckles that relocate control arm mounting points in space—such as “drop spindles”)
  - 15) Front steering tie rod bump steer modifications or shimming of the steering rack +2
  - 16) Alteration of ball joints/dive angles +2
  - 17) Add panhard rod or Watts link (regardless of whether or not the Watts link replaces a BTM panhard rod or the panhard rod replaces a BTM Watts link) (may have spherical joints without an additional points assessment) +4
  - 18) Replace or modify a BTM panhard rod or Watt’s link (may have spherical joints without an additional points assessment) +2
  - 19) Add torque arm (may have spherical joints without an additional points assessment) +4
  - 20) Replace or modify a BTM torque arm (may have spherical joints without an additional points assessment) +2
  - 21) Add a third link to the rear suspension that does not penetrate the floor (may have spherical joints without an additional points assessment) +4
  - 22) Metallic and/or spherical-design replacement suspension bushings +3 (except for shock tops or bottoms assessed in E.1), E.2), or E.3) above, pillow ball camber plate joints, sway bar end links already assessed points in E.7) above, control arm spindle/knuckle joints already assessed points in E.9) above, and panhard rod, Watts link, torque arm, and third links already assessed in E.17) ,E.18), E.19), E.20), and E.21) above.)

## **F. BRAKES/CHASSIS**

- 1) Non-BTM, modified, or relocated brake calipers and/or brake caliper brackets and/or brake rotor diameter +2
- 2) Add front lower stress/arm brace (two attachment points maximum) +1
- 3) Add a third or fourth attachment point to a front or rear strut tower bar (or replace an existing/BTM three point bar) +1 (Additional attachment points must not be tied to any other type of mounting point with anything other than sheet metal)
- 4) Add or modify other chassis stiffening devices or fabricated parts (such as lower stress/arm braces with greater than two attachment points, sub-frame connectors, sub-frame braces, sub-frame mounts, and non-rubber/non-Poly sub-frame bushings, etc.) +3
- 5) Increase in track width greater than four (4) inches due to non-BTM axles, control arms, brake rotors/hats, wheel spacers, hubs, wheel offset, and/or camber adjustment +6 (measured from the inside of one tire to the outside of the opposite tire at ground level—averaging the measurements in front of and behind the contact patch to negate the effect of toe)

## G. AERODYNAMICS:

- 1) Add, replace, or modify front fascia and/or air dam +3 (except as provided for in I.c.3), I.f.3), I.h.14) of the No-Points Modification list) The air dam must be vertical (5° tolerance) and must not protrude from the side of the vehicle or it will be assessed an additional +3 points. Additional points must be assessed below for any component of the added, replaced, or modified fascia or air dam that performs the functions of G.2) and G.3) below.
- 2) Add, replace or modify a single flat, horizontal, front splitter +3 This part may extend horizontally past the side of the vehicle no greater than five inches, with no limit on frontward protrusion. If any portion of this part that protrudes from the side of vehicle is not parallel to the ground, then additional points must be assessed for canards in G.3) below. No material, filler, or part may extend the vertical reach of the BTM front fascia without taking fascia/air dam modification points above (G.1).
- 3) Add or modify canards/winglets (includes portions of an added/modified/replaced fascia that provide a downward force other than that listed in G.2) above) +2
- 4) Add, replace, or modify rear wing and/or spoiler +4 (a rear wing or spoiler may not exceed a height of eight (8) inches above the roofline (or BTM windshield height for convertibles), or a width greater than the width of the car body. (note: additional points must be assessed for end plates that are greater than twelve inches in height---G.8) below)
- 5) Add or fabricate flat bottom/belly tray (rearward of the centerline of the front axle) +5
- 6) Add rear diffuser (note: additional points must be assessed for any vertical panels incorporated into a rear diffuser that are greater than five inches in height---G.8) below) +2 (If taking +2 here for G.6) do not also take assessment for G.7) below)
- 7) Replace or modify BTM rear diffuser, rear bumper cover, or rear “fascia” (note: additional points must be assessed for any vertical panels incorporated into a rear diffuser that are greater than five inches in height---G.8) below) +1
- 8) Add rear vertical panels in any location (note: see G.3), G.6), G.7), and G.10)) +2
- 9) Add or modify side skirts (side skirts must be vertical or an OEM option only, and cannot connect to any other aero component) +2
- 10) Add vortex generator to roof, rear window, or rear deck lid (note: additional points must be assessed for any vertical panels incorporated into a vortex generator that are greater than five inches in height---G.8) above) +1
- 11) Removal of the front windshield/windshield frame +7 (raking is not permitted)
- 12) Front side window frame air dams/diverters (driver and/or passenger side) +2
- 13) Add a non-OEM hardtop to a convertible that is not the identical shape and size of either the BTM or OEM option hardtop for that car model +5 (note: The top must not extend rearward of the front edge of the rear deck lid.) (“Fastback” tops and tonneau covers are not permitted.)

Note: Active aerodynamic modifications (including, but not limited to, computerized, cockpit adjustable, self-adjusting, and OEM/BTM, etc.) are not permitted.

## H. ROLL CAGES:

4-point roll bar and 6-point (two main hoop, two rear brace, two forward hoop) roll cage designs constructed per the NASA CCR may be utilized without a TT Modification Point assessment. Two additional attachment points for either two foot-well bars or two bars to the front firewall (one on each side for the purpose of additional tire intrusion prevention and not attached to frame, dash bar, or cowling) may be added without a TT Modification Point assessment.

Additional bars and/or gusseting within the structure of the cage are permitted without a TT Modification Point assessment. Gusseting of the 6 (CCR) attachment points listed above is permitted without a TT Modification Point assessment provided that the gussets are attached to the tube no further than six (6) inches from the end of the tube, and to the chassis no further than six (6) inches from the end of the tube where it terminates at the plate. Up to three additional attachment points solely for the purpose of bars connecting “NASCAR” style driver-side door bars to the rocker panel are permitted without a TT Modification Point assessment. Additional attachment points within the driver’s compartment that exceed these allowances are also permitted, but will be assessed points as follows:

- 1) One or more bars that penetrate the front bulkhead/firewall +2
- 2) Any other attachment point to the chassis +2

(Note: It is considered a safety hazard to cut through bars without removing them in order to avoid the Modification Point assessments above.)

## **I. NO-POINTS MODIFICATIONS:**

### **a. Tires**

- 1) Tire pressure monitoring systems (TPMS) (Pressure release valves are not permitted.)

### **b. Weight Reduction**

- 1) Sun/moonroof removal and cover roof hole.
- 2) Battery replacement/lightweight battery/dry cell
- 3) Air bag removal (must be removed or disabled)
- 4) Floor mat removal (required)
- 5) BTM jack and spare tire removal, pneumatic/air jack(s) addition
- 6) BTM air conditioner system removal with or without A.C. delete pulley--no point assessment for C.10).
- 7) Lexan windshield, rear window, and rear passenger side windows (windshield must be 3/16” minimum thickness). (See section 7 Safety regarding front side windows) No uncovered holes are permitted in rear windows. Holes covered with tape or other non-porous material preventing air movement are permitted. Rear window removal without replacement is not permitted.
- 8) Front wing window/frame removal and replacement with Lexan

### **c. Engine**

- 1) Fuel: Any grade of commercially available unmodified gasoline or diesel--all octane levels of retail available race gas are permitted. No “home brewed” methanol/ethanol/alcohol mixtures are permitted. Methanol injection systems are illegal. Fuel additives are prohibited with the exception that rotary engine vehicles may add any commercially available oil designed for two-stroke engines as a “pre-mix”. Retail available E-85 is permitted.
- 2) Air filter upgrade (without modification of the air filter housing or air intake system)
- 3) Radiator upgrade/shrouding/fascia modification (drilled or cut holes/slots) that only provides increased airflow to the radiator or oil/transmission coolers (without aerodynamic or engine air intake improvement), and/or radiator core support modification/replacement.
- 4) Starter motor replacement

- 5) Alternator replacement and/or relocation
- 6) Spark plug wires, plugs, coil, ignition replacement/upgrade
- 7) BTM ECU/PCM reprogramming via reflashing or replacement/aftermarket ROM chips or simple ROM boards (The BTM ECU/PCM box/housing and hardware must be used).
- 8) SAFC or VAFC (Super Air Flow Converter/VTEC Control Air Flow Converter)
- 9) Non-BTM sensors or alteration of sensor inputs (such as non-programmable MAF or MAP voltage “clamps”)
- 10) Ignition timing adjustments
- 11) Drive by wire to cable throttle conversion (throttle body must remain identical to BTM in both size and shape to avoid a +2 throttle body assessment).
- 12) Oil systems and coolers other than added dry sump
- 13) Oil catch tanks/cans
- 14) Valve cover replacement or modification
- 15) Carburetor jetting modification
- 16) Carburetor vacuum port blocking
- 17) The addition of a second fuel pump, serving only as a transfer pump to help prevent fuel starvation, that is not connected to the fuel line providing fuel to the engine in any way, and does not increase the maximum fuel flow or pressure provided by the BTM fuel pump
- 18) Engine rebuild with head shave, block decking and 0.020” overbore—provided that compression ratio is not increased by more than 0.5 and displacement is not increased by greater than 1.49%. Forged pistons and internals are legal; however, they must be of equal or heavier weight than the BTM parts, and points must be assessed for de-stroking, and/or increased displacement and compression ratio if greater than the limits listed above. (Note: 0.020” overbore with OEM rods and overbore pistons will yield an increase in displacement of approximately 1.1% for most engines.) If forged internals used are lighter than the BTM internals, then Dyno Re-classing (Section 8.4) should be used to prevent disqualification.
- 19) Engine balancing and blueprinting
- 20) Removal of the engine balance shaft and/or balance shaft drive mechanism
- 21) Non-BTM valve springs and retainers, piston rings, and rotary apex seals
- 22) Turbo blow-off valve upgrade, modification, or addition
- 23) Header and exhaust piping external wrapping, coatings, and/or paint. (The original OEM identification markings must still be legible on all exhaust components that are not assessed points on the Car Classification Form.)
- 24) EGR, smog pump, charcoal canister and associated vacuum line and hose removal.
- 25) Cryogenic treatment of engine components.
- 26) Removal of BTM coolant hoses to the throttle body (without throttle body modification.)
- 27) Re-routing of BTM coolant hoses, and/or removal of heater core.
- 28) Non-BTM fuel lines

#### **d. Drivetrain**

- 1) Wheels, wheel studs, wheel bearings replacement/upgrade, hub modification/replacement, axle modification or replacement (unless otherwise assessed points above).  
Spindles/steering knuckles may be modified or replaced as a No-Points modification to allow for hub size change provided that there are no changes in suspension geometry or mounting point locations (such as tie rod connection height, ball joint connection location/height, etc.)
- 2) Replaced or lightweight flywheel, clutch assembly, and/or driveshaft
- 3) Motor, transmission, and differential mounts and inserts/bushings replacement/upgrade or

- modification (with up to 1 inch of relocation of the motor/transmission)
- 4) Final drive ratio modification
  - 5) Cryogenic treatment of transmission and differential components
  - 6) Transmission and Differential coolers
  - 7) Differential housings (see D.5) & D.6) if there are LSD modifications)

#### **e. Suspension**

- 1) Simple camber, caster, and toe adjustment by any method that does not alter suspension mounting points (unless the modification used is otherwise assessed points above--such as control arm, ball joint, and relocated mounting point modifications). Slotting of the BTM bolt holes and removal of material from the top surface of the BTM strut/shock tower to the extent necessary to allow simple camber/caster adjustment is permitted.). Bolt on camber/caster plates are not assessed points.
- 2) Ride height adjustment (must still take points for springs and torsion bars above)
- 3) Non-metallic and/or non-spherical type replacement suspension bushings (may have metal inner and outer sleeves, but load must be borne by the non-metallic replacement material)
- 4) Shock mount replacement/modification (only if already taking points for both shocks and springs)(may raise or lower mount location up to two (2) inches if no horizontal movement.)
- 5) Inverted rear shocks/struts.
- 6) Non-BTM shocks assessed in E.1), E.2), E.3) above may have spherical tops and/or bottoms without requiring an assessment for E.22)

#### **f. Brakes/Chassis**

- 1) Non-BTM brake pads and rotors (BTM rotor diameter may not be changed; otherwise, F.1 shall apply)
- 2) Brake lines, boosters, proportioning valves, and master cylinder modification, replacement, and bracing.
- 3) Brake duct addition or modification, including electric fans (water sprayers are illegal). Two holes may be cut or drilled out of the front fascia for brake air ducts. Any hole providing improved intake air to the engine will be assessed one (1) point under C.4).
- 4) ABS (anti-lock braking system)--Only OEM systems offered specifically for the car model as a factory option. No OEM systems offered for a different car model or aftermarket systems are permitted.
- 5) Emergency brake removal
- 6) Maximum of two hundred and fifty (250) lbs. of added ballast—All ballast must be of solid material (no fluids or shot pellets) and safely secured in any location on the vehicle approved by NASA safety technical inspectors, [and comply with](#) Section 15.20 of the NASA CCR.
- 7) Seam welding of the body/unibody
- 8) Shock tower reinforcement plate (to strengthen tower shock mount location only--no bars)
- 9) Add front strut tower bar (two attachment points—bolted in or as component of the cage)
- 10) Add rear strut tower bar (two attachment points—bolted in or as a component of the cage)
- 11) Rubber and Polyurethane sub-frame bushings (not Delrin, metal, or other materials)
- 12) Modification of the BTM front bumper frame cross beam is permitted if a modified or replaced bumper beam remains that is equally strong for crash protection.

### **g. Aerodynamics**

- 1) Undertray/ belly pan forward of the centerline of the front axle
- 2) No aero points for removal of convertible soft top/frame and/or adding a hardtop to a convertible provided that the hardtop must be either a BTM, OEM option, or BTM/OEM option shape and size only, and must use a sealed rear window. (i.e., lightweight ok, but no tops with non-OEM aero features).
- 3) Windshield wiper blade removal.

### **h. Body**

- 1) Rolled fender lips
- 2) Flared fenders (Alteration of the inner aspect of fender wells is not permitted, i.e. “tubbing”)
- 3) Steering wheel replacement
- 4) Mirror addition, removal, or replacement
- 5) Gear shifters and shift knob replacement/upgrade
- 6) Seat harnesses (must be compliant with NASA CCR)
- 7) Non-BTM driver’s seat
- 8) Non-BTM front passenger seat
- 9) Relocated Battery
- 10) Accelerator, brake, and clutch pedal modification or replacement.
- 12) Steering rack replacement or modification (without geometry change unless taking points for E.18). Rack ratio change is permitted. Change from BTM power steering to manual, and/or modification of the power steering pump requires the point assessment for engine pulley in C.10).
- 13) NACA ducts, air ducts, or air hoses placed in a side window frame solely for purposes of driver cooling.
- 14) Headlamps, headlight covers, and fog lights may all be removed, and the holes may be covered with material that replicates the shape of the BTM light/cover, leaving the shape of the BTM fascia intact. Uncovered holes may be used for brake ducts. Any hole providing improved intake air to the engine will be assessed one (1) point under C.4).
- 15) Removal of the spare tire floor section of the rear hatch space for the purpose of placement of a fuel cell (only).
- 16) The transmission tunnel may be modified for the purpose of installing a competition driver seat. The floor pan must remain in its original position.
- 17) Data acquisition systems—Telemetry directly or indirectly from/to the ECU is not permitted.
- 18) Dashboard modification, removal, and/or replacement
- 19) Hood pin addition or replacement, including “Aero” type hood pins.
- 20) Fiberglass/carbon fiber doors are permitted provided that the exact BTM body lines are maintained, the doors are still on hinges, and they have an operational external handle.

Note: For NASA racecars/guest classes that are given a base classification in 8.2.1, these modifications must also be legal under the racecar’s class rules. The race class rules for these cars take precedence over this list.

Note: Many of the modifications listed above can/will alter the overall weight of the vehicle. While these modifications are not assessed points individually, and additional weight reduction methods are permitted without individual points assessment (as stated under Weight Reduction), the overall weight of the vehicle and driver (Minimum Competition Weight) will be used to assess points and/or penalties for all vehicles.

## 8.4 Dyno Re-Classing Procedures

### 8.4.1 National TT Director Assigned Re-Classing

The following rules apply to:

Cars that have:

- 1) An added, modified, or upgraded turbocharger or supercharger.
- 2) Non-BTM head(s) or increased number of camshafts (hybrid engines).
- 3) An engine swap that has been designated as requiring dynamometer testing by the National TT Director (almost all swaps)
- 4) A Rotary Engine that has been ported.

And:

All other vehicles that have been designated by the National TT Director to be classed based upon dynamometer testing. A driver/owner may submit a request for a Dyno Re-class for a vehicle that does have one of the above four situations that requires one, but it may not be approved. (Note: only NASA members may request a reclassification from the National TT Director)

### 8.4.2 Re-class Request Procedures

An owner/driver must submit the following information, by e-mail, to the National TT Director ([greg@nasa-tt.com](mailto:greg@nasa-tt.com)), in order to request a Re-classification and new Base Class, before the vehicle can enter competition if the Re-class is required as designated in 8.4.1 above (See Appendix C for the few pre-approved Dyno Re-classes):

- 1) Your name, NASA home region, and series (PT, TT, or both)
- 2) Competition vehicle--year, make, model, subtype and trim type (if applicable)
- 3) Reason for the request (FI, swap, heads, rotary porting, hybrid, not required, etc.)
- 4) Actual measured Displacement, and if a swap: Engine--model #/name, disp, #cyl, valvetrain/VVT?, F/I?, OEM crank Hp & Tq.
- 5) Dynojet dynamometer maximum Hp and Tq (if AWD, then Dynojet, Dynopack, Mustang, or Dyno Dynamics dyno numbers)
- 6) Amount of extra Hp requested for "Dyno Variance" (1-3% recommended over above max Hp)
- 7) Minimum Competition Weight (with driver)

Or, an owner/driver can submit 1-6 above, along with:

- 7) The specific requested new base class, including number of asterisks (7 points each), instead of the vehicle weight. The new Minimum Competition Weight will then be provided in the Official Re-class e-mail response.

The extra Hp requested in 6) above, is to help ensure that any Dyno testing done at another location or at the track by the TT Officials will show hp ratings equal to or less than those provided by the owner/driver.

Once a vehicle is re-classed based on Dyno testing and Minimum Competition Weight, an Official Re-class e-mail will be sent to the competitor, stating the new base class, the new base tire size, and the maximum Dyno horsepower and Minimum Competition Weight limits, as well as any other specific limitations for that particular re-classification. The new base tire size will match the new base class. The competitor will then complete the [PT/TT Car Classification](#)



Form, but will not assess any points for Section 8.3.B (Weight Reduction) or 8.3.C (Engine). Modification Points will be assessed for all other non-BTM modifications. The competitor must not exceed the limits of either power or weight listed in the Dyno Re-class e-mail in order to prevent disqualification. If the vehicle is modified, and the power level or weight has changed, a new request for Re-class must be sent to the National TT Director.

The certified Dyno report will consist of both the Dyno sheet with three separate, reproducible Dyno tests with SAE correction (with the identifying information listed in 9.1) and a completed ST/PT/TT Dyno Certification Form. The competitor must include a copy of the Official Re-class e-mail, along with the certified Dyno report when submitting the [PT/TT Car Classification Form](#) to the Regional TT Director before competition.

**Any vehicle that has been re-classed by the National TT Director and has had a change to either its base class or its base weight in the table in Section 8.2.2 since the re-classification was approved, MUST be re-submitted for re-classification.**

**All Official re-classifications sent by the National TT Director prior to January 1, 2015 must be re-submitted so the re-classification can be verified, and an updated Official Re-Classification e-mail can be sent.**

All competitors will be required to include the latest Certified Dynamometer (Dyno) Report and minimum weight in their vehicle logbook at all times. Any subsequent modifications or adjustments done to the car that could alter power output will require repeat Dyno testing, and a new certified Dyno report. NASA Officials may request repeat Dyno testing at any other time.

#### 8.4.3 Dyno Re-class Specific Penalties

If a car is tested by Officials, and found to have a higher maximum horsepower than was approved on the Official Re-class e-mail and submitted for base classification purposes on the Car Classification Form, it will be considered a “Procedural Violation” (see Section 14 Penalties), and the following formula will be used to determine penalty assessment. Three (3) “penalty” Modification Points will be assessed for every one (1) horsepower above the submitted number. The total number of penalty points will be added to the car’s current number of Modification Points to determine if the car has illegally competed in a class that is too low.

If a vehicle that has been Dyno Re-classed based on its actual competition weight and Dyno power output is found to weigh less than the Minimum Competition Weight listed on its Car Classification Form, it will be disqualified. Following the NASA CCR 17.8, there will be a five (5.0) pound leeway allowed during the first time the vehicle is weighed for that event (weekend). There will be no leeway at subsequent weighings for the remainder of the event. Appropriate penalties will then be assessed per the TT rules (14).

### 8.5 BTM (Base Trim Model) Definition, Updating and Backdating Rules

For the purposes of NASA TT Modification Points assessments, the term BTM will be defined as follows: Any part that is identical in size, shape, and functional characteristics compared to the part that originally came on the vehicle, from the manufacturer, as a standard feature of the base trim model as it is listed in section 8.2 Base Classifications (factory options and specialty

model parts are considered non-BTM) or is listed as a standard replacement part by the manufacturer (OEM). Some parts that are produced by aftermarket manufacturers as generic replacement parts may not require a points assessment provided that: they are the same size and shape, and have the same functional characteristics as the BTM part, and that they provide no significant improvement in performance, longevity, or reliability. If it is determined in impound that such a part does not meet the above description, the driver may be disqualified. Consultation with the Regional TT Director prior to competition is advised for any driver using a vehicle with replacement parts that fall under this exception.

**All factory optional parts, upgrades, and modifications to vehicle specifications must be assessed points**, unless they legally fall under the update/backdate rule or are on the list of No-Points Modifications. **Base classifications are for the standard base model (base trim package) of a vehicle, without factory options or upgrades**, unless there is a specific TT base classification listing in 8.2 for a non-base trim model.

Updating of parts between different model years of the same vehicle model is legal provided that the competing vehicle is both in the same model group listing (same line) in the Table in 8.2.2, and in the same generation of that vehicle model, and that the entire assembly is replaced. Backdating of parts between different model years of the same vehicle model is legal provided that the competing vehicle is both in the same generation and is in the same or higher base class. No interchange of parts between assemblies is permitted in order to create a new assembly. Updating or backdating (without a points assessment) with specialty models or between two cars that have model names with different numbers or letters in them is prohibited, unless specifically approved by the National TT Director. The purpose of this rule is to equalize similar cars in the same (or lower) class, not to allow the creation of vehicles that were never manufactured or homologated. Motors and engine parts cannot be swapped under the update/backdate rule without specific approval by the National TT Director.

## 8.6 Rain Competition

In the event of rain and/or significant standing/running water on the track surface immediately before a competition session, the TT Director may declare that competition session as a “Rain Session.”

If the competition session is declared a "Rain Session" as above, any DOT-approved rain tire of the same size or smaller than listed on the Car Classification Form as used in the prior dry competition session, can be used by the competitor in place of the dry tire. Tire points assessed will remain the same as listed on the “dry setup” Car Classification Form, regardless of whether or not the rain tire compound and size would otherwise yield fewer points or tire size points credit. Similarly, anti-roll (sway) bars may be loosened or removed, without a change in suspension points from the prior “dry setup” Car Classification Form. The purpose of this rule is to allow for these rain setup changes to the vehicles without: 1) the need for changes to the Car Classification Forms prior to the session, and 2) so that a competitor does not gain a points advantage by changing tire size, compound, or sway-bar setup.

## 9 Dyno Testing

### 9.1 Dyno Testing Procedures

The following procedures apply to all vehicles being tested on a dynamometer, whether for initial classing purposes, or for technical inspection post-competition.

A certified Dyno report consists of three separate, reproducible Dyno tests for each Fuel/Timing Map or boost controller setting with SAE J1349 Rev JUN 90 correction, with the car owner's name, car number, car year/make/model, shop name and phone number, and Dyno operator's name on the Dyno sheet, accompanied by a completed ST/PT/TT Dyno Certification Form. All Dyno tests must show horsepower and torque on the Y-axis (vertical) and engine RPM on the X-axis (horizontal) of the Dyno graph. The numerical table of horsepower and RPM (in 50 RPM increments) must be included in the report (for all Dyno tests completed after December 1, 2015). An inductive pickup or other direct sensor shall be used to measure engine RPM (as opposed to obtaining RPM data from the ECU/OBD port or from calibration from the vehicle's tachometer.) If this is not possible due to vehicle configuration, the Dyno operator must note on the Dyno sheet the method used for obtaining RPM data, and the reason for not using an inductive pickup or sensor\*. Dyno testing shall be done with the vehicle at normal operating temperature, with at least 28 psi tire pressure (but should be at normal operating tire pressure if higher)\*\*, and in the gear producing the highest horsepower readings (typically the gear closest to 1:1 ratio)\*\*\*. However, it is the competitor's responsibility to ensure that the vehicle is compliant with horsepower limits in ALL gears. The vehicle's hood shall be open with a cooling fan placed in front of the engine during testing. Engine, ECU, boost controller, etc. settings shall only be altered between Dyno runs in order to obtain the required additional sets of three Dyno tests for each of the alternate ECU Fuel/Timing maps and/or boost controller settings. The highest peak horsepower number of the three tests will be used as the official certified horsepower for weight to horsepower calculations **for TTD-TTF, and the Avg HP will be used for TT1-4 and TTC**. A smoothing factor of five (5) shall be used. All Dyno graphs must show decreasing power for 1500 rpm from the peak horsepower level, or the car must reach the rev-limiter during the Dyno testing. All horsepower measurements will be rounded to the nearest whole number.

\* (note: If an inductive input or direct sensor is not used to measure engine RPM, the competitor must notify the Series Director before competition to determine if the vehicle must be Dyno tested again before competition.)

\*\* (note: If the tire pressures during pre-competition Dyno testing are set lower than their post-competition pressures, it is likely that post-competition Dyno compliance inspection testing will yield higher Dyno horsepower results, putting the competitor at risk for disqualification.)

\*\*\* (note: It is common for BMW M3's, Honda S2000's, Mazda RX-8's, Scion FR-S/Subaru BRZ, Nissan 350Z/370Z to show the highest horsepower readings in 5<sup>th</sup> gear.)

Dynamometer tests must be conducted on a Dynojet Model for front and rear wheel drive vehicles, and on a Dynojet, Mustang, Dyno Dynamics, or Dynapack for AWD cars, in a commercial facility that offers dynamometer testing as part of their business and is open to the public. All (AWD) Dyno test results using a Mustang or Dyno Dynamics dynamometer will have 10% added to the maximum horsepower reading to obtain the number that will be used to calculate the "Adjusted Weight/Power Ratio" (Mustang or Dyno Dynamics Dyno awhp x 1.1 = Maximum awhp for wt/hp calculation). Each Regional TT Director may retain the option to specify which business locations will be the approved centers for that particular region. Please check with the TT Director in your area for instructions.

Certified Dyno reports are potentially valid for up to a maximum of three years (provided that no changes have been made to the vehicle that would alter Dyno readings). However, at his/her discretion, a NASA TT Director may require an updated certified Dyno report (at the driver/owner's expense) after one year from the date of the previous report.

## 9.2 Average Horsepower Calculation (TT1, TT2, TT3, TT4, TTC)

The number used for calculating the Adjusted Wt/HP Ratio for TT1-4 and TTC will be a calculated average giving a better approximation of the maximum horsepower available over a range of usable RPM. For pre-competition testing, the Dyno test with the highest maximum horsepower will be used to calculate this average (not an average of the three Dyno runs) as follows (all horsepower numbers will be rounded to the nearest whole number before any calculations):

**Avg HP** = Average HP calculated and used in the Adjusted Wt/HP Ratio

**Max HP** = Maximum horsepower shown on the actual Dyno graph

The following ten (10) data points will be obtained from the Dyno's 50 RPM data export numeric RPM/HP table printout:

Horsepower at: 500 rpm, 1000 rpm, 1500 rpm, 2000 rpm, 2500 rpm greater than Max HP rpm

Horsepower at: 500 rpm, 1000 rpm, 1500 rpm, 2000 rpm, 2500 rpm less than Max HP rpm

(If any of the above data points at higher RPM than Max HP RPM do not exist due to redline, then those potential data points will not be used in the calculation of Avg HP.)

The three (3) highest data points of the above ten (10) will be used in the calculation below:

$$\text{Avg HP} = \frac{\text{Max HP} + (\text{sum of the three highest data points})}{4}$$

## 9.3 Dyno Compliance Inspections

At random times or at the discretion of the TT Series Directors, any car may be ordered to report for rules compliance testing on a chassis dynamometer. All TT competitors have the option to be present for official chassis dynamometer testing; however, the results of Dyno testing are the property of NASA, and will only be shown to TT Officials, who will let the competitor know whether or not the vehicle was compliant, and may show the competitor the results at their discretion. Competitors must comply with any request by the TT Director to review and/or download ECU program "maps" using the competitor's programming hardware and software, when such equipment is used by the competitor. As well, competitors may have GPS accelerometers placed in/on their vehicles at any time by TT Officials to help verify rules compliance. And, as stated below, GPS monitoring may be used in lieu of Dyno testing when collected data shows convincing evidence of non-compliance.

Dynamometer tests are official and certified when performed by series Officials for compliance testing (without the need for a Dyno Certification Form—but must be signed by the Official). It is the responsibility of the competitor to be within power levels on any Dyno that NASA officials choose to use for testing. The Dynojet will be the preferred Dyno for all vehicles, and will be used exclusively when available. As AWD Dyno availability is limited, NASA Officials may use any of the four AWD Dynos listed above. AWD drivers need to be especially careful that their cars will be compliant on any official Dyno that is available.

For compliance testing, the TT Director (or other NASA Official) and the dynamometer operator will determine: 1) which gear(s) to use, 2) how many test runs to perform for any given vehicle, and 3) what the normal operating temperature is for that vehicle. Tire pressures shall not be adjusted between the time the vehicle was on track competing and the time of Dyno testing. If the competitor violates this rule, the tires will be inflated to 40 psi before compliance Dyno testing. For TT3, the Dyno test run with the highest average horsepower will be used to calculate the Adjusted Wt/HP Ratio. Prior to the dynamometer inspection the competitor may top off any fluids needed to ensure the engine and drivetrain are not damaged during testing. The fluids must be added with a NASA Official present. No other modifications or adjustments may be made to the car. To ensure fairness, a NASA Official, or an individual appointed by a NASA Official, will operate any cars being inspected on the dynamometer. Any run that results in an erratic or non-reproducible result may be dismissed by NASA officials.\*

\* (note: It is common for vehicles to show increasing chassis dynamometer horsepower readings with serial Dyno runs due to increasing operating temperature of the engine and drivetrain, increasing tire temperature/pressure, and, at times, ECU map programming adjusting the fuel/timing maps dynamically. These increasing horsepower readings do not indicate that the Dyno is inconsistent or malfunctioning, or that these are erratic or non-reproducible readings.)

**Vehicles may not have any adjustments during the competition day to systems that allow adjustment of horsepower levels that would serve to alter Dyno readings (unless granted specific permission by the TT Director).** Examples of such systems are driver-adjustable electronic tuning and engine timing advance devices, fuel pump output modification devices, boost controllers, adjustable MAP and MAF voltage clamps, and any other system that could alter the Dyno readings when measured for compliance purposes. Any restriction device placed in the air intake system must be clearly identified as such and marked to indicate its dimensions. Vehicles that have more than one fuel/timing program or “map” in the computer/ECU/PCM must submit a certified Dyno report (3 pulls) for each of those fuel/timing “maps” regardless of which one will be used during competition. As well, the method used to switch between these “maps” must be clearly written on the [PT/TT Car Classification Form](#).

**Any hardware that allows a competitor or crew member to wirelessly or directly connect to the ECU (or alter ECU maps) at any time during competition or post-competition impound is strictly prohibited, regardless of whether such hardware is external or internal to the ECU, and regardless of the direction of data flow.**

NASA has been and continues to actively conduct research on the use of in-car GPS monitoring units as an alternate method of compliance testing of horsepower output. GPS data acquisition monitoring will be used as an additional method of non-invasive compliance testing. Collected data indicating a lack of compliance may be used for disqualification when the National TT Director reviews the data and finds convincing evidence of non-compliance.

## 9.4 Dyno Compliance TT1/TT2/TT3/TT4

Competitors are permitted (and encouraged) to enter an [Average HP on the ST/TT Car Classification Form](#) that is higher than that showing on their certified Dyno report to allow room for Dyno variance (between the pre-competition testing done by the competitor and any compliance testing performed by TT Officials).

At any event where dynamometer testing (or GPS compliance testing) is not available, TT Officials will use the [Average HP](#) entered on the [ST/TT Car Classification Form](#) along with the actual vehicle weight after competition to calculate the “Adjusted Weight/Power Ratio” for that vehicle. However, if the actual vehicle weight is less than the Minimum Competition Weight listed on the [ST/TT Car Classification Form](#), it will be D/Q'd. At their discretion, TT Officials may have the vehicle sealed and transported for off-site Dyno testing at a later date.

At events where Dyno testing is available, TT Officials at their option will use either: a) the [Average HP](#) entered on the [ST/TT Car Classification Form](#) along with the actual vehicle weight after competition to calculate the “Adjusted Weight/Power Ratio” for that vehicle; or b) the results of Dyno testing either requested by TT Officials or performed due to a protest at the track to calculate the “Adjusted Weight/Power Ratio”. Again, if the actual vehicle weight is less than the Minimum Competition Weight listed on the [ST/TT Car Classification Form](#), it will be D/Q'd. Additionally, at the discretion of the TT Director, the Minimum Competition Weight listed on the [ST/TT Car Classification Form](#) may be used for the calculation if the vehicle was either not weighed in impound, or the Dyno inspection was done at a random time.

## 9.5 Dyno Compliance TTC-TTF

At any event where dynamometer testing (or GPS compliance testing) is not available, Time Trial Officials will use the maximum chassis Dyno horsepower level ([Avg HP for TTC](#)) from the certified Dyno report (if there is one) submitted with the [PT/TT Car Classification Form](#) along with the actual vehicle weight after competition to calculate the “Adjusted Weight/Power Ratio” for that vehicle. Alternatively, at their discretion, Time Trial Officials may have the vehicle sealed and transported for off-site Dyno testing at a later date. At events where Dyno testing is available, Time Trial Officials at their option will use either: a) the maximum chassis Dyno horsepower level from the certified Dyno report submitted with the [PT/TT Car Classification Form](#) along with the actual vehicle weight after competition to calculate the “Adjusted Weight/Power Ratio” for that vehicle; or b) the results of Dyno testing either requested by Time Trial Officials or performed due to a protest at the track to calculate the “Adjusted Weight/Power Ratio”. Furthermore, at the discretion of the TT Director, the Minimum Competition Weight listed on the [PT/TT Car Classification Form](#) may be used for the calculation if the vehicle was either not weighed in impound, or the Dyno inspection was done at a random time.

## 10 Timing & Scoring

### 10.1 TT Classification Forms

In order to accrue points or compete, each year/season, all NASA TT competitors must submit a current year, completed NASA [ST/TT or PT/TT Car Classification Form](#) (and certified Dyno

report if re-classed under 8.4 or competing in TT1, TT2, TT3, or TT4) to the Regional TT Director prior to having lap times count toward competition. Once a form has been submitted during a season, if there are no modifications to the vehicle that would change the form, a new form does not need to be submitted at subsequent competitions in the same region. A new ST/TT or PT/TT Car Classification Form copy (and certified Dyno report if applicable) must be submitted when a competitor competes in a different region or at a Championship event, or if changes have occurred to the vehicle that would change the form. Forms can be downloaded here: <https://www.nasaproring.com/rules>. TTU competitors can simply fill out the top section of a ST/TT Car Classification Form (driver/vehicle identification information only), and do not need to submit Dyno reports.

Competitors are permitted (and encouraged) to enter an Average HP number on the ST/TT Car Classification Form that is higher than that showing on their certified Dyno report to allow room for Dyno variance (between pre-competition testing done by the competitor and any compliance testing performed by TT Officials.) Competitors may choose to forego Avg HP calculations for pre-competition Dyno purposes, and use the Maximum Peak HP of the highest Dyno run (or a number higher than Peak HP) for Adjusted Wt/HP Ratio calculations. However, Section 9.4 still applies, and if the actual vehicle weight is less than the Minimum Competition Weight listed on the ST/TT Car Classification Form, it will result in a D/Q.

A driver may choose to compete in a higher level ST/TT class than would be dictated by the “Adjusted Wt/HP Ratio”. A driver may choose to compete in a higher level PT/TT class than would be dictated by the PT/TT Car Classification system.

## 10.2 Timing Format

NASA TT competitors will be scored on a basis of their fastest lap time for an event. An “event” is hereby defined as a single day of competition for regional events. Therefore, a regional NASA weekend would generally count as two separate events. NASA TT competitors will be timed continuously in each designated TT run session that they participate in (which could be a combined HPDE 4/TT run session or a TT-only run session). The sessions are typically between 15 and 30 minutes long. The fastest lap time from all of the sessions will be used as the basis for his/her score for the event. Generally, the first run session of the weekend will not count for TT competition, and will function as a warm-up practice session at the discretion of the region’s TT administration. The TT Director will announce at the driver’s meeting held before the first session of the day whether the first session will be counted for competition or not. As often as possible, all TT competition run sessions will be pre-gridded based on previous lap times to help increase the number of “open track” laps for all competitors.

All competing vehicles must be equipped with an AMB TranX260 transponder in order to obtain lap times. Many NASA regions offer weekend rentals of these transponders for those drivers that do not own one. It is also legal for a vehicle to be equipped with an AMB Display IT lap time display, but it is not required. It is the responsibility of the driver to check the posted TT results after each session to ensure that the correct name, car number, and TT class is listed. Failure to notify the TT Director and Timing and Scoring officials of errors prior to the next session may result in disqualification of the previous and subsequent session’s lap times. Teams must be especially careful to notify T&S of their team status/name at the beginning of the weekend, as most of the on-line registrations are input by an individual member or owner of a

team, and that individual's name is often transferred automatically to the T&S computer before the event, instead of the team name.

### 10.3 Regional Championships

NASA TT competitors will accrue points only in their declared NASA TT class and only within the region sanctioning the NASA TT event they are competing in. Certain multi-region events will be designated as "crossover events", and the points earned by a visiting driver at such an event will be applied to both regions' championship series so the driver can choose to compete in either or both regions for the rest of the year. A driver competing in a crossover event in his/her home region that also desires to have the points applied to both regions' series needs to give the visiting TT Director a copy of his/her [ST/TT or PT/TT](#) Classification form.

NASA TT competitors will be allowed to drop at least their two lowest event scores to arrive at their total score for year-end awards. The total amount of events scored for year-end award purposes will be the total amount of point's events held in the region plus designated crossover events minus two. The Regional TT Director must declare which events, if any, will not accrue points. Also, a Regional TT Director may choose to increase or decrease the number of dropped scores, especially if there are multiple crossover events. This information will be provided prior to any crossover events. Please consult your Regional TT Director for more information on which events in your region will qualify for NASA TT points. A driver must participate in a minimum of four (4) points event days (per class) to be eligible for championship series trophies, awards, or prizes at the end of the year (unless your Regional TT Director has announced otherwise). [A Regional TT Director may declare that certain events, including the Championship events, will count for "double points" for that region.](#)

Points will be distributed for each event as follows:

1st- 100, 2nd- 90, 3rd- 85, 4th- 80, 5th- 75, 6th- 70, 7th- 69, 8th- 68, 9th- 67, 10th- 66...and so on, subtracting one (1) point for each position after 10th. In the extremely unlikely event that two competitors end an event day with the same exact fast lap time, a tie will be declared, and both competitors will get the same number of points for the day. The next closest competitor will get points for the position two places down from the tied pair. Last place points will be given to registered competitors who drove on track (during a TT practice or competition session) but never received an official lap time due to a mechanical failure of the vehicle or a spin/4-off lap time disqualification. Drivers disqualified for other rules violations that do not have an official "legal" lap time, will not be given last place points for the event in their declared class. If the disqualification was due to the car competing in the wrong class, it will be at the TT Director's discretion whether to award last place points in the class that the car should have been competing in.

In the event of a tie for season points, the winner will be decided using the following criteria in the order listed, until the tie is broken:

1. Most 1st places
2. Most 2nd places
3. Most 3rd places
4. Most 4th places, etc.
5. Average points per event
6. Head to head battles (number of times driver "A" finished ahead of driver "B" when competing at the same events.



## 10.4 Declaring a Class

Competitors must declare the class they are competing in at the mandatory morning meeting before any competition begins. This can be accomplished by pre-registering in the correct class or by announcing a change in the listed class during the meeting. Switching classes or late registration after the meeting is only permitted with the specific approval of the TT Director. A driver/team can choose to compete or accrue points in any class that is equal to or higher than the vehicle's classification. For all classes, the appropriate TT Classification Form must be filled out completely, scored, and show the appropriate final vehicle classification. The competitor can then declare on the form if the car will be competing in a higher class. When a TTC-TTF competitor chooses to "jump up" to the TT1-TT4 Dyno based classes, the car must have a legal certified Dyno report with Dyno Certification Form. Points will accrue only in the class declared by the competitor prior to competition. The competitor can switch classes, using the same vehicle on another event day, provided the above rule is followed and a new declaration is made to the Regional TT Director prior to competition. Points will then begin accruing in the new class. There will be no retroactive declarations or "points swapping" after-the-fact. A competitor can switch back and forth between classes multiple times on different days, provided that appropriate class letters are designated on the vehicle, NASA Timing and Scoring is notified of the change in class to update the computer, and a legal declaration is made to the Regional TT Director. (Note: This rule is advantageous to the competitor that is planning on making mid-season modifications to the vehicle that will cause the vehicle to jump up in class. The competitor can predict the class that the vehicle will eventually be modified to, and begin accruing points in that class from the start of the season, even though the vehicle may not be as competitive early in the season.)

## 10.5 Vehicle Substitutions

NASA TT is a contest between drivers or teams (see 10.7 Teams) competing in a particular class, and as such, a driver/team may change or substitute vehicles and continue to compete and accrue points for the season, provided that a NASA **ST/TT or PT/TT** Classification Form is submitted to the Regional TT Director and approved for the substitute vehicle prior to competition. The vehicle must be classified in the same, or in a lower class, than that in which the driver/team desires to accrue points. The substitution can be for a single session or day (as in a substitution due to a mechanical malfunction of the primary vehicle), or it can be for any number of events remaining in the season. In the case of a temporary substitution where a car is entering competition midday, the driver/team must provide the Regional TT Director a completed Car Classification Form, and have the vehicle available for compliance inspection, at least one hour prior to the car competing. Only one vehicle substitution can occur for a driver/team per event day. Once a substitution has occurred, the driver/team is not permitted to bring the original vehicle back into competition that day. There is no limit to the number of substitutions that can occur during the season, as long as the correct procedure is followed:

1. Provide the Regional TT Director with a new NASA **ST/TT or PT/TT** Car Classification Form, and have the vehicle available for compliance tech inspection at least one hour prior to the first competition session for the vehicle. If the TT Director already has a completed Car Classification form for the vehicle (i.e., switching back to the primary vehicle on another day), then the driver must simply give notification of the substitution to the TT Director at least one hour prior to the first competition session for the vehicle.

2. Transfer the AMB transponder, assigned car number, and class letters to the substitute vehicle, and remove any other transponder from the vehicle. If it is not possible to swap the transponder(s) because it is hard wired to the vehicle(s), then NASA Timing and Scoring (and the Regional TT Director) must be notified of the driver/team change and transponder issue before the lap times will count. As well, in that situation, consult your Regional TT Director and T & S to determine whether or not you should change the car numbers.
3. Do not attempt to run the original vehicle from earlier in the day after the substitution has been completed. The TT Director and T&S must always be aware of which vehicle, transponder, car number, and class that a car and driver will be competing in prior to that run session.

Since it is likely that a temporary substitute vehicle will belong to another TT competitor or racer, any error in switching transponders or notifying NASA Timing and Scoring and the TT Director may result in both competitors losing their prior lap times for the day if the correct (verified) driver/team is not listed on the timing and scoring computer. Also, multiple competitors cannot share the same vehicle during a run session, even if they are able to switch transponders. Only one driver may drive a TT vehicle per session.

## 10.6 Competing in Multiple Classes

A driver/team can choose to compete in multiple TT classes simultaneously on the same event day using one or more cars each with its own transponder; however, the driver/team must register and pay registration fees for the additional vehicle(s) even though there are only a limited number of TT and/or HPDE 4/TT run sessions. The driver will not be given extra track time in another run group (i.e. HPDE 3) to make up the difference. The driver/team must register all vehicles, make the declaration of running in multiple classes at a single event, and submit all TT Car Classification forms to the TT Director at the beginning of the day, before the first session. Late entries for additional classes will not be accepted or valid. In the case of a driver entering a single car in multiple classes, the driver must use a different transponder for each class, and pay registration fees for each class. This rule may be advantageous for teams that choose to run more than one vehicle, while it will be costly for a single driver. A team may not run more than one vehicle in the same class during a run session. Only one driver may drive a car during a run session—as above in 7.5, no sharing of vehicles during a given run session. Also, a driver may drive only one car during a run session. He/she cannot drive for part of a session in one vehicle, then switch to another vehicle for the remainder of the run session.

## 10.7 Teams

While NASA TT is primarily a competition between individual drivers in a given class, there are legitimate reasons for drivers to choose to compete as a team, instead of as individuals. Some of these reasons include: lack of funding to compete solo, inability to attend an entire season's events, pooled resources for doing repairs/maintenance/vehicle storage/travel, team sponsorships, expectation of a driver moving up to TT mid-season, and others. Teams are legal in NASA TT, provided that specific guidelines are followed. While individual competitors will get recognition for their achievements using their full names, teams will be recognized only by their team names. Track records made by a member of a team will be recorded with the team name, not the individual's. Championship trophies, if engraved, will have the team name on them, and website results will list the team name.

A team is composed of two drivers. A driver may only be on one (1) team per TT class. All drivers must be approved for a NASA TT license before they can compete (see 5 above), but unlicensed potential drivers can be listed on the team roster that must be turned in to the Regional TT Director before beginning competition as a team. The primary car owner will be the designated team captain. A team will be designated by the word “Team” followed by the team captain’s last name, or the team captain’s chosen name. The Regional TT Director must approve all chosen names. **The team must declare their driver list on the TT Car Classification form before they will begin to accrue points as a team. Prior points earned by either driver will not be carried over to the newly formed team.** Once the team is declared, the two drivers shall have their future points tallied together. Either driver may drive the car in practice or competition TT sessions at an event; however, both drivers must be registered for that event (if both are driving). A driver may collect points for himself/herself, independent of his/her declared team, as long as he/she notifies the Regional TT Director before the first competition session of the day. A team may not run more than one vehicle in the same class during a run session.

If a team splits up mid-season, the team captain will retain rights to the team name and the team’s points, and may use either of the drivers on the original roster to continue to compete; however, all recognition for wins, track records, championship placing, etc. will still go to the team, not any individual.

A driver can be a member of more than one active team; however, he/she can only compete with one TT team on any given day. A driver may compete for one team and as an individual on the same day (in different classes), provided that appropriate registration fees are paid.

## **11 On-Course Conduct**

NASA TT competition will take place during advanced-level, open-passing combined NASA HPDE/TT sessions or in separate NASA TT run groups at the discretion of the Event Director. All regulations applicable to NASA HPDE as set out in the NASA CCR will apply to NASA TT competitors. All NASA TT competitors are expected to drive in a safe and controlled manner in compliance with the NASA CCR’s, namely Sections 6 and 7. Any NASA TT competitor that places more than two wheels off course during an incident, or has both front or both rear wheels off course at the same time, will lose any timed result from that session. Any competitor who spins a vehicle greater than 80 degrees relative to the track direction or loses control of the vehicle such that it creates a potentially dangerous/hazardous condition if another vehicle was nearby will lose any timed result from that session. This rule specifically applies to any competitor who drops wheels off the track and “hooks” back across the track, regardless of whether the vehicle spins or goes more than two wheels off. It also applies to “tank-slappers” where the driver has to significantly slow the vehicle to regain control to the point that a closely following vehicle would be forced to make an evasive maneuver to avoid car contact. Also, any vehicle that hits a wall or another vehicle may be disqualified for any number of sessions, including the entire event, at the discretion of the TT Director. TT drivers MUST keep their vehicles under control at all times! Any driver with a passenger in the car that gets a D/Q for a session due to a spin or wheels-off incident will lose passenger privileges for the rest of the day.

NASA TT drivers are held to a high standard in regard to track etiquette, driver cooperation, and sportsmanship. Any driver found by NASA TT administration to be “blocking” another car in order to slow the following driver’s lap time will be subject to harsh penalties, which may include expulsion from further TT competition. Drivers are cautioned not to deliberately draft with another vehicle, except immediately prior to making a pass. Prolonged drafting or “team” drafting may result in penalties for both drivers. In-car video is encouraged by NASA for a variety of reasons, and would be helpful to determine if a car is purposefully blocking or drafting. Any driver displaying unsportsmanlike conduct either on or off the track, driving in an over-aggressive manner, or failing to cooperate with other drivers on the track will be subject to harsh penalties, which may include expulsion from further TT competition.

## **12 Car Appearance**

### **12.1 Numbers and Class Designation**

All NASA TT cars must display a three-digit number on both sides and the front and rear of the car unless a one or two digit number has been assigned to that vehicle by NASA TT administration. Numbers must be of a contrasting color to the car or otherwise clearly visible, at least 10-inches tall with a 1.5-inch stroke for the sides, and four inches high for the front and rear. NASA TT cars must also display a class designation on both sides and the front and rear of the car in a four-inch height in contrasting color to the car. Class Designations shall be TT followed by the group number. For example, a B Class competitor would display “TTB” as a class designation. [Vehicles that already have class letter designations for a single ST or PT class, may compete in the corresponding TT class without TT class letters on the vehicle \(example: vehicle with “ST2” letters may compete in TT2 without having the “TT2” letters\).](#)

### **12.2 General Car Appearance**

All vehicles must be in good condition and appearance. Vehicles with excessive body damage, primered body panels, etc., are not permitted. The vehicle must meet the “50/50” rule, which means it must look undamaged and straight at fifty (50) mph from fifty (50) feet away.

### **12.3 NASA Decals**

All NASA TT cars must display a minimum of two NASA decals, one on the front and one on the rear of the vehicle. Additionally, if the competitor is participating in any contingency award program(s), there must be two more NASA decals (on each side of the vehicle).

## **13 Safety**

### **13.1 Car Preparation, Technical Inspection, and Logbooks**

All cars must meet the safety and car preparation standards specified at Section 11 of the NASA CCR. All convertibles must meet the roll bar specifications contained in the CCR for HPDE participation. In addition to the HPDE safety rules, it is highly recommended that all TT vehicles carry a NASA CCR compliant fire extinguisher with a metal mounting bracket (not on

the “A pillars”). As well, we encourage all participants to obtain and use as much CCR compliant personal and vehicle safety equipment as possible.

Front driver and passenger side fixed/Lexan windows are specifically not permitted unless they are factory installed during the manufacturing of the vehicle. Both front side windows must otherwise be in the down position while on track. (See TTU exception in 7.2)

As an added benefit for those that compete on a regular basis (especially those whose cars require a trailer tow to get to an authorized tech station): In lieu of the usual HPDE vehicle technical inspection as outlined in the NASA CCR Section 11, a driver/owner that possesses a National NASA TT License may opt to follow a tech inspection process similar to that used by NASA racers in CCR Section 16, where the vehicle is issued a NASA TT inspection log book. However, the driver must also be the owner of the vehicle used, and must be competent to perform a vehicle technical inspection. As well, in doing so, the driver/owner takes on the same responsibilities that apply to racers. As such, any driver failing to properly prepare his/her car as required by the tech sheet may be subject to license revocation, monetary fines, disqualification, or other penalties. All vehicles will be subject to random safety inspections while at the track facility. If at any time, illegal, non-conforming, or outdated safety equipment is found in or on the car, that equipment (in its entirety) will become the property of NASA. Additionally, the driver will be fined \$50 for each separate offense, and will lose the privilege to forego the CCR Section 11 HPDE technical inspection process, and the logbook will be revoked. The same penalties shall apply if the driver/owner is found to have inaccurately performed the vehicle inspection, or falsified entries on the inspection sheet.

After a TT licensed driver/owner has accepted the above responsibility, he/she may be issued a NASA TT inspection logbook by his/her home NASA Region for a standard regional processing fee. The vehicle must then be thoroughly inspected by a NASA authorized inspector using the CCR Section 11 criteria. Subsequent inspection by a NASA authorized inspector is required on an annual basis each calendar year before the vehicle’s first event, and if the vehicle has been in a crash, had new safety equipment installed, or if the logbook notes indicate that re-inspection is necessary. At each event, the car must display the NASA annual tech inspection decal. Drivers that have a NASA Competition Vehicle Logbook for racing, and are compliant with Section 16 of the CCR, can follow those procedures in lieu of the above procedures.

[It is expected that vehicles that will be participating in a NASA Championship event will have an Annual tech inspection decal prior to the Championships event \(obtained during a regional event\).](#)

## 13.2 Download Sessions

NASA TT drivers are expected to attend every scheduled/announced “download session” after a run session (as are HPDE 4 drivers and instructors that choose to drive in a combined HPDE 4/TT run group). Failure to attend a download meeting without being excused by the Regional TT Director or his designee may result in loss of the previous session’s lap times, and/or the next session’s lap times or loss of track time for the next session (at the discretion of the Regional TT Director). Serial unexcused absences will result in TT license revocation. These post-run session meetings are a vital component of the NASA TT safety program.

## 14 Penalties

Various penalties are listed and underlined in the following sections of the TT Rules: (3, 5, 8.4.3, 9.2, 10.2, 11, 13.1, 13.2, 16).

The overriding rule regarding car classification will be, as written in Section 3, "...penalties for non-compliance with the rules will be harsh, and may include disqualification and expulsion from further NASA TT competition with a single infraction, regardless of the nature of the infraction." The penalty for serial non-compliance will be either expulsion from further NASA TT competition or suspension followed by classification in an unlimited class for any future events.

However, the **minimum** penalty for a driver found to be competing in a class that is too low (for whatever reason) will be disqualification of all lap times for the entire event day. Since 10.4 does not allow a competitor to switch classes until a different day, the competitor may continue to drive in the remaining sessions for practice, but all times will be disqualified, and no points will be earned that day in that class, and it cannot be used as a "drop" day. It will be at the TT Director's discretion whether to award last place points in the class that the car should have been competing in. If the infraction is found on the first day of a competition weekend, the TT Director may allow (at his discretion) the driver to compete on the second day in the correct class (whether by up-classing, or de-modification of the vehicle). As well, if there have been no changes to the Car Classification Form that show evidence that a change was made to the vehicle that led to it becoming non-compliant at a certain point in time, or other evidence that the vehicle was compliant in previous events (such as official post-session weight inspections), or if the driver admits that, in retrospect, the car was not compliant at previous events, the TT Director may revoke all previous points in that class, with or without assigning last place points for the driver in the higher class for those events. Note that based on the above rules, a driver whose car is found to be underweight and illegal for its declared class, is disqualified for that entire day, and will get zero points in the declared class for that day, that cannot be "dropped", regardless of whether or not it was weighed earlier in the day after another session.

Any Procedural Violation of the rules that is found after a competition session will result in disqualification of the timed session prior to the discovery of the Procedural Violation. The following are all Procedural Violations: failing to revise or resubmit a Car Classification Form after new modifications have been made, incorrectly assessing Modification Points, failing to note all modifications that require points assessment, failing a Dyno test by any amount, providing any incorrect information on the Car Classification Form, and failing to meet the Minimum Competition Weight listed on the Car Classification Form.

Failure of a competitor to report a mistake in scoring which benefits himself/herself is a form of unsportsmanlike conduct. Because NASA TT events are continuous throughout the entire day, and cars are subject to compliance inspection at any time while at the event, failure of a TT competitor to report to the TT Director a failed Dyno test in another competition series (while simultaneously competing in TT) shall be considered another form of unsportsmanlike conduct. The penalty for unsportsmanlike conduct may include expulsion from further NASA TT competition or suspension followed by classification in an unlimited class for any future events.

Drivers are encouraged to seek the advice of their Regional TT Directors (or National TT Director) for any questions about the classification and modification points rules pertaining to

their vehicles, prior to competition. If a question still remains, the driver should request an inspection of the car or the parts in question by the TT Director for clarification, and assistance with appropriate vehicle classification.

## **15     Protests**

A competitor may protest the on-track behavior of another driver, or a suspected violation of the TT rules by another competitor. These protests should be made directly to the Regional TT Director. In the event of a conflict of interest, where the Regional TT Director is also a TT competitor and will be directly affected by the results of the protest, the TT Director shall appoint a substitute referee to handle the protest. Potential substitutes include the National TT Director, NASA Regional Director, Event Director, Race Director, or other National NASA Officials, depending on the nature of the protest. A driver may appeal the ruling of the Regional TT Director or “substitute referee”, in writing by e-mail, to the National TT Director [greg@nasa-tt.com](mailto:greg@nasa-tt.com), within 2 business days of the ruling. The National TT Director will then make the final decision as to how the issue will be resolved. In the event that a substitute referee was used to handle the initial protest, the Regional TT Director may also appeal the ruling to the National TT Director for final adjudication.

Any protest requesting a Dyno test of a competitor's vehicle will require the protesting competitor to submit a cash deposit in the amount necessary for NASA to obtain the Dyno test. If the protest is found to be valid, the deposit shall be returned to the protesting party, and the competitor that was found to be non-compliant will be required to pay for the Dyno test. If the vehicle is found to be compliant, the protesting party will forfeit the deposit, and it will be used to pay for the Dyno test.

Drivers may appeal any decisions made by a Regional TT Director regarding car classification or Modification Points assessment to the National TT Director for final adjudication.

At the NASA Championships, the National TT Director will make final determinations on all TT protests and classing issues. In the event of a conflict of interest, where the National TT Director is also a TT competitor and will be directly affected by the results of the protest, there will already be an appointed “TT Race Director” for that specific TT class that will rule on the protest. The National TT Director may appeal any decision by the aforementioned TT Race Director to the NASA Executive Director or Executive Committee at the event for final adjudication.

TT license revocations can be made by: the Regional TT Director with NASA Regional Director approval, NASA Regional Director, National TT Director, Chief Divisional Director, and NASA Executive Director. These decisions are final, with no appeal per the CCR mechanism available. The competitor with a revoked TT license may reapply when authorized by the National TT Director, provided that he/she has not been permanently expelled from NASA. A new license may be granted at the discretion of TT administration at that time. As well, the competitor may be restricted to competing in one of the unlimited classes if the revocation was due to non-compliance with car classification rules.

The above rules will supersede NASA CCR sections 17.5.1, 17.5.2, and 17.5.3; however, the National appeals process listed in 17.5.4 will remain valid, with the exceptions that the words “National TT Director” will be substituted in place of the words “Race Director”, and “Executive Director” will be substituted with “Executive Director or Executive Committee”. Section 17.6 Bad Faith Protests shall also be valid.

## **16 Vehicle Inspection/Impound**

All completed [ST/TT](#) and [PT/TT](#) Car Classification Forms will be available from the TT Director for review by any competing driver by request while at the track (or posted on-line at the TT Director’s discretion). NASA TT series administration reserves the right to perform random vehicle inspections and/or impounds at any time that the vehicle is at the track facility. These inspections may be done for the purpose of rules compliance verification or for safety inspection. Inspections may be a simple visual verification or car weight measurement, or may be complex, involving internal inspection of part’s assemblies using bore scopes, diagnostic computers, compression testing/whistlers, Dyno testing, and/or disassembly and removal of parts for analysis. Although a rare occurrence, any requested disassembly will be the responsibility of the driver/owner to perform or to arrange for another mechanic to perform under the observation of a NASA TT inspector. The driver/owner will bear all financial responsibility for such disassembly and reassembly, regardless of whether or not the vehicle is found to be in compliance. Vehicles classed based upon Dyno test results (TT1, TT2, TT3, [TT4](#) and Dyno Re-classed [TTC-TTF](#)) are still subject to requests for engine and electronic/wiring disassembly.

At random times or at the discretion of NASA Officials, any car may be ordered to report for rules compliance on a chassis dynamometer. All Time Trial competitors have the option to be present for official chassis dynamometer testing; however, the results of Dyno testing are the property of NASA, and will only be shown to Time Trial Officials, who will let the competitor know whether or not the vehicle was compliant, and may show the competitor the results at their discretion. Competitors must comply with any request by TT Officials to review and/or download ECU program “maps” using the competitor’s programming hardware and software, when such equipment is used by the competitor. As well, competitors may have GPS accelerometers placed in/on their vehicles at any time by Time Trial Officials to help verify rules compliance. And, as stated above in Section 9, GPS monitoring may be used in lieu of Dyno testing when collected data shows convincing evidence of non-compliance.

Should a driver/owner elect not to participate in any requested inspection for rules compliance verification, he/she will be disqualified from the event, all season points will be forfeited, and he/she may only be permitted to continue to compete in one of the unlimited classes, at the discretion of the National TT Director.

## **17 Website Posting**

A variety of useful information pertaining to our regional and National TT programs will be posted on the National NASA TT website <https://timetrial.nasaseries.com> as well as multiple regional NASA websites, <http://www.nasforums.com>, and <http://www.nasachampionships.com>.



This information includes the names, car numbers, and vehicle years, makes, and models of our competitors. It also includes event results, championship standings, narratives describing recent events, driver profiles (only when submitted by the driver), and photographs and video footage of our events and competitors.

## **18 NASA TT Championship Events**

### **18.1 General Info & Driver Eligibility**

Beginning in 2014, there will be two NASA Championship events held annually, the NASA Western States Championship and the NASA Eastern States Championship. These events will provide more diversity than the previous single annual event, as the venues will change yearly, the travel distance will be shorter for competitors, and each event will be condensed into a three-day format, allowing opportunity for many that could not participate in the past. As well, drivers can participate in both events if they desire. TT competition will be included at each event. The winners of each TT class at these events will be declared the NASA TT Western or Eastern States Champion for that year.

In order to be eligible to compete in the NASA Western States Championship a TT competitor must score TT points in **four** regional TT events, in any region, in any TT class, on at least four (4) different event days, prior to the registration deadline for the Championships.

In order to be eligible to compete in the NASA Eastern States Championship a TT competitor must score TT points in **four** regional TT events, in any region, in any TT class, on at least four (4) different event days, prior to the registration deadline for the Championships.

Drivers planning on competing in the higher level classes (TT1, TT2, TT3, and TTU) must have regional experience driving in those classes, in vehicles of similar performance characteristics to the vehicle they plan to compete with at the Championships. For example, a driver that usually drives a TTF car will not be permitted to drive a TTU sports racer without showing evidence of prior experience in such a vehicle.

TT drivers are permitted to participate as a team under the following circumstances. The team must have been legally declared (10.7), and scored points in the required number of events above. However, each of the drivers must have personally driven in at least one session in each of the events used for eligibility. Either driver may drive in any or all of the competition sessions at the Championships under the team name. A driver participating with a TT team may only compete in a single TT class, and may not participate simultaneously as an individual.

Drivers desiring to obtain eligibility to compete individually at the Championships and use point scoring events where they drove as part of a team in regional TT events will need to obtain a waiver from the National TT Director. Drivers arriving at the event without fully completing the above eligibility requirements will be penalized harshly, and may not be permitted to either compete or drive.

**All drivers should obtain a NASA TT Log Book for the vehicle before the event in order to avoid additional fees and possibly lost track time at the Championship event.**

Each driver may compete in a maximum of two TT classes (must be as an individual, not as a team). If using a single vehicle, the classes must run in separate run groups. This may only be possible for a few vehicles to accomplish depending on the final published schedule of class and run group separation. If using multiple vehicles, each one must have its own transponder.

Car numbers will be assigned based on a first registered, first served basis for number choice.

The competition will be based on the single best lap time obtained by a competitor during any of the declared competition sessions for the entire event (Note: “event” in this case does not mean a single day of competition as in regional TT events).

## 18.2 Meetings

Drivers must attend all scheduled download sessions and meetings (usually a morning meeting and one or two download sessions), regardless of whether they drove in a session or not. If the TT Director (also called “Race Director” at this event) determines that a driver has an unexcused absence from a download session, the driver’s lap times from the previous competition session will be disqualified. As well, the driver will be penalized and not allowed to drive in the next run session if the driver had an incident (DQ) in the prior session, and may be similarly penalized if his/her name or car number are brought up for discussion for other reasons. Drivers that are both competing in TT and racing in other run groups (or are officials/event staff), that have unavoidable time conflicts that prevent their presence at a download session or meeting, should notify the TT Director and have a proxy (can be another competitor) attend the meeting for him/her. Having a proxy attend a meeting without requesting an excused absence prior to the meeting will not suffice, and penalties will apply unless there is an extraordinary circumstance. If that driver was involved in an incident of any type during the previous run session, he/she should report to the TT Director as soon as possible. Note: Lack of driving in the TT session

prior to the meeting is not an excuse for missing the meeting. Drivers with an unexcused absence that did not drive in the prior session will not be permitted to drive in the following session. If a driver is leaving the event early, prior to the last session on Sunday, he/she must notify the TT Event Staff so he/she can be excused from further meeting attendance.

Any driver failing to attend the initial mandatory TT meeting on the morning of the first day of competition without an excused absence by the TT Director will not compete on the first day. If the TT Director has the time to go over all of the information presented during the meeting with the driver, he may allow the driver to drive for practice (with DQ’d lap times) for the remainder of the day. In either case, once the driver arrives, he/she must still attend all of the download sessions, regardless of whether or not he/she drives. Similarly, for any driver that arrives on the second or final day of competition, the first morning meeting of that day will be considered to be his/her “initial mandatory TT meeting”. Therefore, a driver that doesn’t arrive until the final day of competition, and has an unexcused absence from the morning meeting, will not compete in the event.

## 18.3 Classification Forms & Vehicle Substitutions

All NASA TT Championships Car Classification Forms must be submitted to the TT Director at or before the initial mandatory morning TT meeting. Any changes made to the vehicle during

the event that would change anything written on the Form, must be reported immediately to the TT Director.

Dyno sheets must be labeled with the driver's name and car number, and attached to the TT Car Classification Form for all cars in TT1, TT2, and TT3, and all cars that have been Re-classed by the National TT Director based on Dyno testing. Dyno sheets must be from the appropriate, approved dynamometer type (Dynojet only for FWD & RWD, and Dynojet, Dynapack, Dyno Dynamics, or Mustang for AWD cars). Failure to submit an appropriate Dyno sheet (when one is required, as above) will be penalized by disqualification in TT competition sessions #1, #2 and #3, and the car will continue to be disqualified for subsequent TT sessions until an appropriate Dyno sheet is submitted. If an AWD Dyno is not available at the track, the driver must arrange to have an appropriate Dyno test completed off-site before TT session #4 or subsequent TT sessions will count toward competition.

Vehicle substitutions may only be made at the morning meetings, and at no other times. Vehicles submitted for approval for substitution on the final day of competition must be available for technical compliance inspection, dyno testing, GPS monitoring, etc. during the entire day, beginning immediately after the morning meeting. The first session that a substituted vehicle is driven in will serve as a practice session (does not count toward competition) for the driver, regardless of whether or not it is a designated practice session for the rest of the run group. So, a vehicle substituted before the last session on Sunday will not have lap times count toward competition.

Any potential change in class or addition of a second class after the start of the first competition session will be at the discretion of the TT Director, and will require the approval of the National TT Director.

#### **18.4 On-Track Procedures**

Passengers are not permitted. Any driver taking a passenger will be D/Q'd for that session and the following session (Note: Passengers are permitted in some regional event competition sessions.)

Once a car enters the track, it is not permitted to enter the hot pits except to go to the black flag station or to exit the track. No work, adjustments, or tire checks may be done in the hot pits. Once a vehicle enters the hot pits, it must exit the track and go directly to Impound. The only exception is if a vehicle has entered the hot pits to go to the black flag station and the driver is instructed by a NASA Official to go back on track. All cars must report directly to Impound after exiting the track, regardless of how many laps were completed. If a car has a mechanical failure, it must still report to Impound to avoid disqualification of that session's lap times (even if it is on a flatbed).

Cars will be pre-gridded based on their prior best lap times, except for the first practice session of the event. D/Q's will be put into the T&S computer system at the end of each day. So, at times, drivers could be getting gridded based on lap times that will later be D/Q'd. Drivers should know their grid position before coming to pre-grid. All drivers should attempt to arrive at pre-grid 10 minutes prior to the scheduled session start time. As soon as the prior session's group goes on track, the pre-grid is open. The grid will be closed when the first TT car goes on

track. Once the grid is closed, cars arriving late will not be permitted to go on track without the approval of a TT Official.

The pole-sitter will take the cars out on track at 45 mph. This speed will be maintained until all cars are on track to provide the largest number of open hot laps to the group. Once all cars are on track, the pole-sitter will begin to pick up the pace. Drivers should position their cars so there is about 1 to 1.5 seconds behind the car in front of them at the green flag, taking care to avoid the appearance of drafting down the front straight. During the “paced” lap and the first hot lap there is no passing permitted unless the passing driver is specifically given a point-by from the driver ahead.

All vehicles will report to impound/tech immediately after exiting the track after every TT session. This is required regardless of the number of laps that are driven during the session. Drivers and crewmembers are not permitted to touch anything on the vehicle in the hot pits. Tire temps and pressures may be taken in the Impound/Tech area only, under the watch of TT Event Staff. Tire pressures must not be adjusted until the vehicle is released from impound. Care must be taken when checking tire pressures so that air is not released when checking them. Any car that has been chosen by NASA TT Event Staff to be Dyno tested that has been found to have had adjustments to tire pressures will have the tires inflated to 40 psi prior to the Dyno testing. Cars must be released from impound by a TT Event Staff member. If a driver comes off track early, and there is not one there yet, he/she must wait until one arrives. If a member of the Impound/Tech staff is “releasing” a driver without TT Event Staff present, the driver must inform them that he/she has been impounded by TT Event Staff, and then ask where he/she should park the car until TT Event Staff arrive. Once a car is in impound, the driver may stay in the driver’s seat and wait for further instructions from TT Event Staff, or the driver may exit the vehicle and stand next to it, with the helmet and safety gear placed in the vehicle. The hood must remain closed, and nobody may test or work on the car. The driver may not re-enter the vehicle until instructed to do so.

Additional details on the format, schedule, and rules specific to the NASA TT Championships will be published at a later date on the <http://www.nasachampionships.com> website, <http://www.nasaforums.com> in the TT forum, and/or on the NASA National TT website <http://nasa-tt.com>. As well, Regional TT Directors will also disseminate this information.

## **Appendix A—Technical Bulletins for Specific Models/Items**

### **Allison Legacy: (TTD):**

Maximum Dynojet 105 rwhp/140 ft-lbs

Minimum competition weight: 1675 lbs

All vehicles must comply with the Allison Legacy Race Series 2010 Rule Book

(note: Allison Legacy cars built for the 2012 Pro 4 Stock Car Road Racing Series have not been approved for TTD at the time of this publication. They can compete in TT1,2,3,4)

### **BMW E46 models in the 1999–2006 range:**

Allowance of repair and/or prevention of rear sub-frame connection point failures as noted in the settlement of the class action lawsuit settled 8-10-09 with BMW. The following modifications are permitted without a Modification Point or Modification Factor assessment, and are not intended as performance enhancing modifications:

The material used cannot exceed 0.110" (inches) in thickness. Plates may be trimmed to fit the area being repaired or reinforced. Any vertical offset of the sub-frame or suspension caused by the use of these plates is legal. Holes are allowed for the existing fasteners and for additional holes for rosette welds. Existing cracks or damage may be welded before the repair.

1. One plate (A) not to exceed 206MM x 108mm in size. Two bends are allowed to contour to chassis but must be included in overall size.
2. One plate (B) not to exceed 163mm x 81mm in size. One bend allowed to contour to chassis but must be included in overall size.
3. Two plates (C) not to exceed 134mm x 73mm in size, (one plate per side).
4. Two plates (D) not to exceed 66mm x 42mm in size, (one plate per side).
5. Two plates (E) not to exceed 82mm x 92mm in size, (one plate per side).

Plates (A), (B), (C), and (D), must be placed between the sub-frame and differential carrier and can be attached to the underbody by welding or bonding. Plate (E) can only be used in the trunk area to cover the access hole made to weld the top of the sub-frame connections, and can be attached by welding or bonding.

### **Chevrolet Corvette C5 & C6:**

1) Removal of the B-pillars (and OEM arch) above the window sill lines is permitted if replaced with a NASA-legal full competition race cage. Any changes to the roof line will result in the Modification Factor assessment listed in the rules above.

2) The OEM driver side floor top layer of fiberglass and balsa wood under the seat may be removed without a Modification Factor assessment for the purpose of gaining head room for the driver. When inspected from the underside, the OEM floor pan must be unchanged, and the OEM metal supports where the seat studs attach must be unaltered.

3) The OEM balsa wood floors may have the wood removed and substitute meta flooring in the same location as the OEM wood floors with an additional Modification Factor of -0.2. It is not permitted to raise or lower the floor from the OEM height compared to the rest of the body/chassis, without taking the "Non-Production Vehicle" Modification Factor. If the wood flooring is left intact, metal plating may be placed over the wood, inside the cockpit, without an additional Modification Factor.

### **CTSC Tires:**

Continental Tire Sportscar Challenge EC-Dry tires (225, 245, 275 only) are exempt from the -0.7 Modification Factor for Non-DOT approved tires when calculating the "Adjusted Wt/Hp Ratio". They will use the tire size Modification Factors for DOT approved tires. As well, they are +8 point tires under section 8.3.A.5. (Does not include "Rolex series" tires).

### **Factory Five Roadster and Backdraft Cobra (TT1/TT2/TT3 only):**

No Modification Factor for FF Challenge "standard front air dam" or exact replica built with different material on Production status approved vehicles.

**Ford Mustang and BMW E-36 M3 (TT1/TT2/TT3 only):**

"Upper sub-frame connectors" that penetrate and modify the floor pan will be assessed a -0.2 Modification Factor (seen commonly in American Iron Mustangs).

**Lotus Elise and Exige:**

The Lotus Elise and Exige optional rear toe link brace, along with the spherical joint that replaces the ball joint and attaches to the inboard end of the toe link bar are no-points modifications. OEM geometry, suspension mounting points, the outboard end joint on the toe link, and the toe link bar itself must remain stock.

Similar aftermarket braces that meet the above requirements will also be no-points modifications (even if they have spherical joints on the static ends of the brace itself). Aftermarket kits that include a replacement toe link bar will be assessed +1 point. Aftermarket kits that change the outboard toe link joint to a spherical/heim joint will be assessed an additional +3 pts. for "metallic replacement suspension bushings". Aftermarket kits that do not use the OEM/BTM mounting locations for the toe link ends will be assessed an additional +6 pts. for "relocation of rear suspension mounting points".

**Mazda Miata ('90-'97):**

Replacement of the OEM/BTM '90-'93, '95 (with VIN's higher than 14193), '96-'97, and '99-'00 Mazda Miata ECU 4.0MHz "clock" crystal, and the OEM/BTM '94 and '95 (with VIN's lower than 14193) Mazda Miata ECU 8.0MHz "clock" crystal with an aftermarket crystal of different frequency, sometimes referred to as "overclocking" of the ECU, is permitted as a no-points modification.

**Mazda MX-5 Global Cup Racecar ('16-'17)(TTC):**

Minimum Competition Weight: 2400 lbs.

Tires: Either Mazda MX-5 Global Cup specified non-DOT 215mm, or any model DOT-approved tire, size 215mm or smaller.

Aero: No aerodynamic modifications when compared to the BTM (base trim model) Mazda MX-5 ("Sport" trim street model), including no factory optional aerodynamic modifications (such as front air dam/splitter, side sill extensions, rear bumper skirt, rear lip spoiler).

**Mazda RX-7 (1<sup>st</sup> Generation):**

A Watts link plate that puts the center pin into double shear for safety purposes only (and has been approved previously for Pro7 use in the SoCal region), is approved for use in PT and TT without a points assessment. Any other changes to the Watts link will require a points assessment per the PT/TT Rules.

**Mazda RX-7 13B:**

1. Modification of the Variable Dynamic Intake (VDI) by removal of the actuator mechanism, and permanently wiring the VDI open will be a No-Points Modification.
2. Modification of the 5th and 6th port runners, by removal of the actuator mechanism, actuator rods, and removal of the sleeves themselves, will be a No-Points Modification. As well, removal of the actuator mechanism and actuator rods, and fixing the sleeves in the open position will also be a No-Points Modification. However, under either circumstance, if there is any filler material added, non-BTM sleeves added, modification of the BTM sleeves, or other modification to the runners, the car will need to be re-classified based on Dyno testing.

**Nissan 350Z/370Z:**

The Nissan 350Z and 370Z shall be considered the same “model” in regard to sub-frame updating and backdating in 7.3.2.A.1c).

**Nissan Sentra:**

The Scott Russell linkage shall be deemed to be equivalent to a BTM Watts link when assessing points for Suspension mods E.17 and E.18.

**S2000 and Adjustable Ball Joints:**

S2000's, and all other cars, that are using aftermarket adjustable ball joints to gain camber, must take the +2 point assessment for "Alteration of ball joints/dive angles".

**Thunder Roadster pre-'08 body/no-wing type:**

May still compete in TT4 with the rear suspension mounting point relocations, as designated in Section 9.3.4.3 of the NASA Spec Thunder Roadster (GL) Rules:

Rear suspension may be modified to use longer rear swing arms and rear shock mounts may be moved to outside of frame. Any 3 point rear suspension is allowed. Only one fixed pick-up point allowed per radius rod end. Trailing arm radius rods are to be the same equal length. If using radius rod mounting plates, the plates will be marked at the beginning of the season by the Series Director and can only be replaced by notification and approval of the series Director. Maximum length for radius rods (trailing arms) is 22.5.” Trailing arms radius rods may be of aluminum or steel construction with a minimum diameter of .840 & .750 respectfully. Third link must be of aluminum or steel construction with a minimum diameter and must remain within the stock pick-up point locations as delivered by U.S. Legend Cars International. Panhard bar must be of steel construction with a minimum diameter and must remain within the stock mounting location as delivered by U.S. Legend Cars International. Note: All radius rods (7.5”, 10”, 11”, 12”, 13”, 22.5”) length measurement will have a tolerance of +/- 1/8” (0.125”).

**Appendix B—“Adjusted Weight/Power Ratio” Calculations for TTC-TTF**

All TTC-TTF cars are subject to a limit on their “Adjusted Weight/Power Ratio”, where exceeding that limit would bump the car into a higher TT class or into the TT1-4 classing system. This is in addition to each vehicle being compliant with base classification and Modification Points results.

All vehicle weights will be measured to the tenth of a pound (xxxx.x), then rounded off to the nearest pound for all calculations. Any weight ending in “.5” (xxxx.5x) will be rounded up or down to the benefit of the competitor. Any “Adjusted Weight/Power Ratio” calculation ending in “.995” (xx.995) will be rounded up to the benefit of the competitor.

**TTC Adjusted Weight/Power Ratio Calculations:**

The “Adjusted Weight/Power Ratio” for each vehicle can be calculated based on a simple competition weight to average horsepower (Avg HP) ratio (wt/hp), followed by the adjustment of the resulting ratio by adding to or subtracting from it, based on the list of “Modification Factors” below. Competition weight is defined as the minimum weight of the vehicle, with driver, any time that it competes in a timed session.





## TTD- TTF Adjusted Weight/Power Ratio Calculations:

The “Adjusted Weight/Power Ratio” for each vehicle can be calculated based on a simple competition weight to peak chassis dynamometer horsepower ratio (wt/hp), followed by the adjustment of the resulting ratio by adding to or subtracting from it, based on the list of “Modification Factors” below. Competition weight is defined as the minimum weight of the vehicle, with driver, any time that it competes in a timed session.

*Note: Peak chassis dynamometer horsepower and dynamometer testing procedures are defined in Section 6. (All horsepower measurements are rounded to the nearest whole number.)*

*(AWD cars utilizing a Mustang or Dyno Dynamics Dyno for testing must multiply the hp result by 1.1)*

The “Modification Factor” listed after each item below is added or subtracted from the actual measured Wt/HP ratio to determine the “Adjusted Weight/Power Ratio” that determines vehicle legality in each TTD-TTF class.

\_\_\_\_\_ Base Wt/HP Ratio (\_\_\_\_\_ lbs competition weight / \_\_\_\_\_ peak chassis horsepower)

\_\_\_\_\_ Body Type: 4-door Sedan or 5-door Wagon = +0.2

\_\_\_\_\_ Transmission: Dog-ring/straight-cut gears (non-synchromesh), sequential/paddle shift/semi-automatic = -0.2

*Note: No assessment for an automatic transmission utilizing a torque converter.*

\_\_\_\_\_ Drivetrain: AWD = -0.3  
FWD = +1.0

\_\_\_\_\_ Tires: Size 275 mm to 250 mm (DOT approved) = +0.4  
Size 245 mm or smaller (DOT approved) = +0.8

*Note: Tire modification factors are applied based on the widest tire on the car.*

\_\_\_\_\_ Competition Weight:

Equal to or **less** than:

3200 lbs -0.05	2750 lbs -0.50	2300 lbs -0.95	1850 lbs -1.40
3150 lbs -0.10	2700 lbs -0.55	2250 lbs -1.00	1800 lbs -1.45
3100 lbs -0.15	2650 lbs -0.60	2200 lbs -1.05	1750 lbs -1.50
3050 lbs -0.20	2600 lbs -0.65	2150 lbs -1.10	1700 lbs -1.55
3000 lbs -0.25	2550 lbs -0.70	2100 lbs -1.15	1650 lbs -1.60
2950 lbs -0.30	2500 lbs -0.75	2050 lbs -1.20	1600 lbs -1.65
2900 lbs -0.35	2450 lbs -0.80	2000 lbs -1.25	1550 lbs -1.70
2850 lbs -0.40	2400 lbs -0.85	1950 lbs -1.30	1500 lbs -1.75
2800 lbs -0.45	2350 lbs -0.90	1900 lbs -1.35	1450 lbs -1.80

Equal to or **greater** than:

3400 lbs +0.05	3650 lbs +0.30	3900 lbs +0.55
3450 lbs +0.10	3700 lbs +0.35	3950 lbs +0.60
3500 lbs +0.15	3750 lbs +0.40	4000 lbs +0.65
3550 lbs +0.20	3800 lbs +0.45	
3600 lbs +0.25	3850 lbs +0.50	

*Note: If between 3201 lbs and 3399 lbs, there is no modification factor.*

\_\_\_\_\_ **“ADJUSTED WEIGHT/POWER RATIO”**

TTD 14.25:1 minimum

TTE 16.50:1 minimum

TTF 19.50:1 minimum

### Example Calculations of “Adjusted Wt/Power Ratio”

Example: 1995 BMW M3, with OEM transmission, on DOT approved  
245 size tires, weighing 3051 lbs, with peak chassis dyno power of 215 hp:  
 $3051/215 = 14.19$ , plus 0.8 (DOT 245mm tires), minus 0.15 (weight less than 3100 lbs)  
 $= 14.84$  (TTD)

Example: 1990 Honda CRX Si, with OEM transmission, on DOT approved 225 size  
tires, weighing 2101 lbs, with 120 peak hp:  
 $2101/120 = 17.51$ , plus 1.0 (FWD), plus 0.8 (DOT 245mm tires), minus 1.10 (weight  
less than 2150 lbs)  $= 18.21$  (TTE)

### **Appendix C—Pre-Approved Dyno Re-classing**

The following pre-approved Official Dyno Re-classes may be used without e-mailing the National TT Director. The driver should print out the page, and submit it along with the certified Dyno report and the TT Car Classification Form to the regional TT Director.

Mazda Miata '90-'93 (1.6L), no motor swap, non-BTM head, or F/I:

Your '90-'93 Mazda Miata 1.6L with a maximum 125 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2300 lbs, will have a new PT/TT base class of PTE/TTE. Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '90-'93 Mazda Miata must be assessed points, with the following exception. Only +1 point will be assessed, instead of +3 points under section 8.3.F.4 for the use of a 1997 Miata sub-frame brace, IF the vehicle is also being assessed for size 205 tires, +3 for a Mazdaspeed front chin spoiler, +2 for bump steer/shimming due to the use of Miata "R" model tire rod ends, and +2 for the use of Mazdaspeed sway bars. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Director.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

This is an Official, approved, Dyno Re-Class copied from the current TT Rules, Appendix C

Mazda Miata '90-'93 (1.6L), no motor swap, non-BTM head, or F/I:

Your '90-'93 Mazda Miata 1.6L with a maximum 125 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2205 lbs, will have a new PT/TT base class of PTE\*/TTE\* (seven points). Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '90-'93 Mazda Miata must be assessed points, with the following exception. Only +1 point will be assessed, instead of +3 points under section 5.3.F.4 for the use of a 1997 Miata sub-frame brace, IF the vehicle is also being assessed for size 205 tires, +3 for a Mazdaspeed front chin spoiler, +2 for bump steer/shimming due to the use of Miata "R" model tire rod ends, and +2 for the use of Mazdaspeed sway bars. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Series Leader.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

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Mazda Miata '94-'97 (1.8L), no motor swap, non-BTM head, or F/I:

Your '94-'97 Mazda Miata 1.8L with a maximum 127 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2375 lbs, will have a new PT/TT base class of PTE/TTE. Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '94-'97 Mazda Miata must be assessed points. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Series Leader.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

This is an Official, approved, Dyno Re-Class copied from the current PT Rules, Appendix C

Mazda Miata '94-'97 (1.8L), no motor swap, non-BTM head, or F/I:

Your '94-'97 Mazda Miata 1.8L with a maximum 127 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2265 lbs, will have a new PT/TT base class of PTE\*/TTE\* (seven points). Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '94-'97 Mazda Miata must be assessed points. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Series Leader.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

This is an Official, approved, Dyno Re-Class copied from the current PT Rules, Appendix C

Mazda Miata '99-'00 (1.8L), no motor swap, non-BTM head, or F/I:

Your '99-'00 Mazda Miata 1.8L with a maximum 129 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2415 lbs, will have a new PT/TT base class of PTE/TTE. Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '99-'00 Mazda Miata must be assessed points. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Series Leader.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

This is an Official, approved, Dyno Re-Class copied from the current PT Rules, Appendix C

Mazda Miata '99-'00 (1.8L), no motor swap, non-BTM head, or F/I:

Your '99-'00 Mazda Miata 1.8L with a maximum 129 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2305 lbs, will have a new PT/TT base class of PTE\*/TTE\* (seven points). Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '99-'00 Mazda Miata must be assessed points. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Series Leader.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

This is an Official, approved, Dyno Re-Class copied from the current PT Rules, Appendix C

Mazda Miata '01-'05 (1.8L), no motor swap, non-BTM head, or F/I:

Your '01-'05 Mazda Miata 1.8L with a maximum 130 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2445 lbs, will have a new PT/TT base class of PTE/TTE. Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '01-'05 Mazda Miata must be assessed points. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Series Leader.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

This is an Official, approved, Dyno Re-Class copied from the current PT Rules, Appendix C.

Mazda Miata '01-'05 (1.8L), no motor swap, non-BTM head, or F/I:

Your '01-'05 Mazda Miata 1.8L with a maximum 130 rwhp on a Dynojet, and a Minimum Competition Weight (w/driver) of 2335 lbs, will have a new PT/TT base class of PTE\*/TTE\* (seven points). Your new base tire size is 235mm. You will not assess modification points for Section B. Weight Reduction or Section C. Engine Mods. However, all other modifications, including transmission and LSD, that are not standard items on a base trim '01-'05 Mazda Miata must be assessed points. You must be compliant with the above listed maximum Dynojet HP and Minimum Competition Weight during any tech. inspection.

**This option may only be used with a PTE/TTE or higher Final Competition Class.**

Please keep a copy of this e-mail and the most recent Dynojet sheets and Dyno Certification Form with the vehicle log book as proof of re-classing. Also, turn in a copy of this e-mail, the Dynojet sheets, and the Dyno Certification Form with your PT/TT Car Classification Form to your Regional PT/TT Series Leader.

Note that the car will still need to be compliant with the Minimum Adjusted Wt/Hp Ratio for whichever Competition Class you choose to run in.

This is an Official, approved, Dyno Re-Class copied from the current PT Rules, Appendix C

## **Appendix D— TT3 & TT4 OEM Aero Modification Factor non-BTM approvals**

The following vehicle higher level trim models are approved for the OEM Aero Modification Factor (Section 7.3.2.D.1):

BMW E30, E36, E46, E90/92/93 M3

Chevrolet Corvette C5 Z06

Chevrolet Corvette C6 Grand Sport, Z06, ZR1 (Front Fascia only)

Ford Mustang Boss 302 ('12-'13)

Note: To request approval of additional higher level trim models for the OEM Aero Modification Factor, send an e-mail request to the National TT Director, [greg@nasa-tt.com](mailto:greg@nasa-tt.com).