



®

# NASA Super Touring 5 (ST5)

## Official 2018 National Rules

(Rules subject to change)

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# **NASA Super Touring 5 (ST5)**

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### **1 Introduction**

NASA Super Touring (ST) and NASA Super Unlimited (SU) are automobile road course (circuit) competition series focused on road course 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 names “NASA Super Touring® (ST)” and “NASA Super Unlimited (SU)” 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).

NASA ST provides a venue for spirited on-track competition in high performance race cars of all makes, models and types. Several key factors are considered in classing vehicles in ST, using an “Adjusted Weight/Power Ratio” as the ultimate equalizer between vehicles. The relatively few modification specific rules will allow competitors to configure their cars to perform at an optimal level by using aftermarket parts, providing an opportunity for promotional exposure for the competitors’ sponsors, aftermarket tuners, parts manufacturers, and the vehicle manufacturers. Additionally, these series should provide a stage to showcase driving talent, in hopes that the most talented drivers will advance to even higher-level professional series. The format of the rules encourages direct crossover from both NASA TT classes and race classes from other organizations.

There are five Super Touring classes—Super Touring 1, (ST1), Super Touring 2 (ST2), Super Touring 3 (ST3), Super Touring 4 (ST4), and Super Touring 5 (ST5), with ST1 being the highest performance level class of the five, and ST5 being the most restrictive. These rules pertain only to the Super Touring 5 class (please see “Super Touring 1-4 & Super Unlimited” rules for the other classes). An “Adjusted Weight/Power Ratio”, modified based on competition weight, tires, brakes, suspension, chassis, body, transmission, and drivetrain is used to equalize cars in Super Touring 5. (Note: Super Touring 6 is planned for 2019, and will be included in this ruleset.)

## **2 Intent**

The intent of these rules is to provide mandates to ensure that all Super Touring 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. The rules shall be applied in a logical manner that seeks to provide competitors a safe and fair venue for competition, without a constrained interpretation of the rules based on phraseology or verbiage.

**Rule changes will be announced via Technical Bulletins published in the Super Touring section of the [www.nasaforums.com](http://www.nasaforums.com) website and/or the NASA Super Touring website <https://supertouring.nasaseries.com/> .**

## **3 Sanctioning Body**

The NASA ST/SU series is supported and sanctioned by the National Auto Sport Association (NASA). All race events are governed by the rules set forth by the Race Directors, National Series Directors, and NASA Officials. All competitors must also abide by the rules set forth in the current Club Codes and Regulations (CCR) and any supplemental rules issued by the Race Directors, Regional Directors, or National Series Directors.

## **4 Eligible Manufacturers/Models/Configurations**

All vehicles must either be listed in section 6.3.3 or originate as four-wheel, fendered/closed-wheel, Production street vehicles with less than 265 hp (two-hundred sixty-five) factory rated engine horsepower, an engine displacement less than 5.1L (unless specifically approved by the National ST Director), and comply with the modification limitations in section 6.1 of these rules.

“Production” vehicle models are those manufactured by an automobile manufacturer (at least 500 produced per year) and approved for street use by the U.S. D.O.T. (Non USDM vehicles may be approved by the National ST Director on a case-by-case basis).

Sports racers, “Prototypes”, monocoque chassis purpose-built race cars, “kit” cars, purpose-built track/race cars, tube-frame, and partial tube-frame conversion vehicles are specifically prohibited, unless listed in section 6.3.3.

**All competition is based on the “Adjusted Weight/Power Ratio” (section 6.3) below:**

**Super Touring 5 (ST5) = “Adjusted Wt/HP Ratio” equal to, or greater than, 14.00:1**

The National ST Director will determine and publish any additional Modification Factor(s), limitations, and/or restrictions placed on specific vehicle models.

## 5 **Safety**

### 5.1 CCR Exceptions

All rules in Section 15 of the NASA CCR shall apply, with the following exceptions that shall 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 above the minimum required can be used. Any number of additional tubes, including those penetrating the firewall are permitted. (note: any tube(s) penetrating the firewall/front bulkhead shall be assessed a Modification Factor.) Tube-frame chassis conversion (partial or complete) is not permitted. 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.

CCR 15.10—Front driver and passenger side fixed/Lexan windows are specifically not permitted. Both front side windows must be in the down position while on track.

CCR 15.20—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 not disallowed by NASA safety technical inspectors, and comply with Section 15.20 of the NASA CCR.

### 5.2 On Course Conduct

Any driver displaying rough, careless, and/or irresponsible driving or displaying unsportsmanlike conduct may receive harsh penalties, which may include loss of points, suspension, and/or monetary fines at the discretion of NASA Officials.

In addition to the passing/punting rules in the NASA CCR:

Along any straight section of the track, if attempting to pass or attempting to prevent a pass, a driver that forces another competitor to drive off the racing surface in order to prevent car-to-car contact will be penalized by the Race Director. The penalty will be solely at the discretion of the Race Director, but the suggested minimum penalty for such a dangerous and unsportsmanlike maneuver is disqualification and a one race suspension.

## 6 **Modifications**

“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.

**Unless listed otherwise, performance enhancing modifications are unlimited.**

## 6.1 Restrictions and Limitations

All Super Touring 5 vehicles must adhere to the following modification restrictions and limitations

### 6.1.1 Power Modification Limitations

- 1) Nitrous Oxide use is prohibited. Pre-existing tanks must be removed.
- 2) Methanol/Alcohol-water injection is not permitted.
- 3) Engine swaps are permitted, but the donor vehicle must be a model eligible to compete in ST5 (section 4).
- 4) From the start of qualifying through the end of post-race 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 Race 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.**

### 6.1.2 Tire Limitations

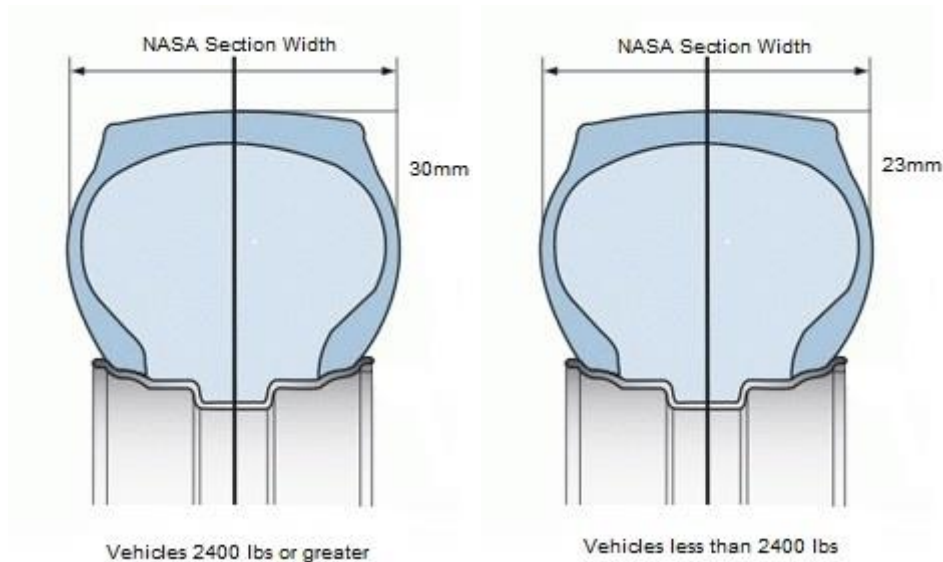
- 1) Compound
  - 1) Tire treatments and softeners are not permitted.
  - 2) Non-DOT approved tires are not permitted in ST5.
  - 3) DOT-approved R-compound autocross tires (“A-tires”) are not permitted in ST5. (examples: A6, A7, R1S, RS AC, Z214-C90/91)

#### 2) “NASA Section Width”

DOT tire width is determined by a measurement of the “NASA Section Width” of the largest tire (if staggered sizes) on the vehicle in post-competition impound/inspection, without changes to tire inflation (may be allowed to cool to pre-competition pressure). The tire may be measured while off or on the vehicle at any location not affected by ground contact sidewall deflection. A tire's NASA Section Width is the measurement of the tire's width from its inner sidewall to its outer sidewall using the NASA Section Width tire measurement tool(s) (excluding any protective ribs, decorations or raised letters) at the point 30mm deep to the tread surface on a new tire for vehicles 2400 lbs. or greater, and 23mm deep to the tread surface for vehicles less than 2400 lbs.

If a worn tire on the vehicle is found to be out of compliance in impound, the competitor has the option to bring a new tire, on the same wheel type/size, and at the same tire pressure, to retest for compliance. Similarly, a competitor may protest another's worn tire thought to have been non-compliant at the start of competition. However, the protesting competitor may need to obtain the new

tire and pay for dismount and mounting fees if a new tire/wheel combination is not readily available. If the tire is found to be non-compliant, those fees must then be paid by the competitor with the non-compliant tire.



NASA Section Width tire measurement tools should be available at each NASA region technical inspection/impound area. **The tool should fit loosely on the tire and not bind. It should fall if not being held in place.** Additionally, templates for each tool size are available in a separate .pdf file on the NASA rules page.

NOTE! NASA Section Width measurement often DOES NOT correlate with the tire size printed on the tire by the manufacturer, and wheel width will change the NASA Section Width measurement. For example, a tire designated as a 245 by the manufacturer may not fit the 257mm NASA Section Width measurement tool. Use caution when selecting wheels and tires, and consult your regional series leader if you have questions.

### 3) Size

- 1) Vehicles with a Minimum Competition Weight greater than 2749 lbs. must have a measured tire NASA Section Width equal to or less than 266mm.  
(note: Most currently produced size 245 tires should fit within this measurement range on manufactured recommended wheel sizes)
- 2) Vehicles with a Minimum Competition Weight between 2749 lbs. and 2400 lbs. must have a measured tire NASA Section Width equal to or less than 257mm.  
(note: Most currently produced size 225 tires should fit within this measurement range on manufactured recommended wheel sizes)
- 3) Vehicles with a Minimum Competition Weight less than 2400 lbs. must have a measured tire NASA Section Width equal to or less than 226mm.  
(note: Most currently produced size 205 tires should fit within this measurement range on manufactured recommended wheel sizes)



4) All DOT-approved tires must be available for purchase by the general public through Federal or state licensed tire dealers.

### 6.1.3 Chassis and Body Modification Limitations

- 1) Other than the listed exceptions, every 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
  
  - 2) The following are the permitted exceptions to #1 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) Bump steer kits are permitted. "Drop spindles" are considered a relocation of suspension mounting points, and are not permitted.
    - 1d) Modifications of transmission cross-members and mounts, differential mounts, and radiator core supports are permitted.
    - 1e) 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.
    - 1f) 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.
    - 1g) Reinforcement of suspension mounting locations on OEM frame rails, Sub-frames/suspension cross-members, and unibody is permitted provided there is no performance benefit or relocation of the mounting points. Seam welding of the body is permitted.
    - 1h) "B" pillars of the unibody may be notched to accommodate the placement of roll cage door bars provided that the notched area is welded to the bar(s) that intrude into the B-pillar.
  
  - 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, [air intake hose](#), 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”.

- 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 suspension components.
  - 6d) Floor pan modifications to include items such as sub-frame connectors, atypical roll cage bracing, or alternate fuel cell placement may be approved on a case-by-case basis by the National ST Director, or included in Appendix A, and are subject to possible Modification Factor assessments.
- 7) Removal of the windshield and windshield frame is permitted for convertible top models, but will be assessed via the Modification Factor in the “Adjusted Weight/Power Ratio”.

#### 6.1.4 “BTM Aero” Modification Factor

Vehicles that maintain the unmodified Base Trim Model (BTM) body lines, do not have non-BTM aerodynamic aides or modifications, and do not have a rear wing or rear spoiler may assess the Modification Factor for “BTM Aero” in calculating the “Adjusted Wt/HP Ratio”. Under this specific rule, an aerodynamic aide is considered non-BTM 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 options permitted.

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

- 1) Flat undertray/belly pan forward of the centerline of the front axle.
- 2) 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 OEM, an OEM option, or the same shape and size of an OEM/OEM option top.

- 3) Lexan front, rear, and rear side windows without uncovered holes.
- 4) Front wing window/frame removal and replacement with Lexan.
- 5) Hood replacement/modification for venting and/or weight reduction ("aero" hood pins are permitted).
- 6) Removal/cutting/drilling of the fascia for engine cooling, air intake, brake ducting, and transponder mounting purposes.
- 7) Removal of rain gutters/drip edges, windshield wipers, and mirrors.
- 8) Flared and/or rolled fenders. (Only to extent necessary to cover tire as viewed from above)
- 9) NACA ducts, air ducts, or air hoses placed in a side window frame solely for the purpose of driver cooling.
- 10) 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 BTM light/cover, leaving the shape of the BTM fascia intact.

#### 6.1.5 ST5 Aerodynamic Modification Restrictions and Limitations

Active aerodynamic devices and/or modifications (including, but not limited to computerized, cockpit adjustable, self-adjusting, and OEM) are not permitted.

If not using the BTM Aero Modification Factor, aerodynamic parts/devices/aides shall be limited in ST5 to the following:

- 1) All of the items listed above in section 6.1.4 "BTM Aero" Modification Factor.
- 2) Vertical front air dam (5° tolerance) that follows or extends beneath the outermost edge of the front and side bodywork/fascia.
- 3) Single flat, horizontal front splitter that protrudes no greater than 4" from where it intersects with the fascia or air dam. Along the entire splitter, there must be at least 1" of fascia or air dam material above/superior to where the splitter intersects the fascia/air dam, including at any air intake region. A Modification Factor will be assessed for any non-BTM splitter.
- 4) Single rear wing or spoiler that does not exceed a height above the roof line, or width greater than the vehicle's body width, or end plates greater than 12" in length or height, or 12" protrusion from the rear of the vehicle. Body width does not include flared fenders, mirrors, splitter, door handles.
- 5) Modified BTM, non-Base Trim Model (non-BTM), or replaced front fascia (unless specifically approved in Appendix B:
  - 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 during the original manufacturing process 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.
- 6) Cutting/removal of the rear bumper cover/fascia where it does not cover the rear frame/bumper cross beam.

- 7) Complete removal of both the windshield and windshield frame is permitted on OEM convertible top vehicles, but will be assessed the Modification Factor listed in section 6.3.2. The OEM cowl may be replaced with a flat cover between the hood and the dash, but no air deflectors may be added, and the entire cockpit must remain uncovered.
- 8) Convertibles may use aftermarket hardtops that are not compliant with 6.1.4.2 above, but they will be assessed with the Modification Factor for roofline/shape, may not extend rearward of the front edge of the OEM rear decklid, and the OEM windshield frame location must be preserved.

#### 6.1.6 ST5 Braking Systems

- 1) Anti-lock braking systems (ABS) may only be OEM or offered specifically for the car model (that generation, any trim model) as a factory option. No OEM systems offered for a different car model or aftermarket systems are permitted.
- 2) Non-OEM, modified or relocated brake calipers/brackets or rotor diameter modifications are permitted, and shall be assessed a Modification Factor. (This assessment applies unless covered by update/backdate in 6.2.)

#### 6.1.7 Transmissions

- 1) Non-OEM Transmission swaps are only permitted when used in conjunction with an engine swap. Note--The transmission must come from the same donor vehicle model as the engine, and that donor vehicle must be a model eligible to compete in ST5 (section 4). Otherwise, the transmission must be OEM.
- 2) Any internal gear(s) from the original manufacturer (or donor vehicle manufacturer in the case of an engine/transmission swap) may be used, provided they originate from a model that is eligible for competition in ST5, and they are not straight cut/dog ring gears.
- 3) Vehicles with OEM street-legal model available paddle shift/DCT/SMG will be assessed with a Modification Factor.

#### 6.1.8 Suspension

- 1) Cockpit adjustable and non-OEM active and semi-active adjustable suspension components are not permitted.
- 2) If the vehicle has an OEM suspension design utilizing an upper "A-arm" or "Wishbone" type control arm on either the front or rear suspension, a Modification Factor will be assessed. Conversion from an alternate design to an "A-arm" or "Wishbone" suspension design using non-OEM parts is not permitted (front or rear).
- 3) Control arms, camber arms/links, toe arms/links may be modified, replaced, or removed, and a Modification Factor will be assessed. Adjustable plates, shims, and eccentric bolts and bushings for camber/caster adjustment are not

assessed a Modification Factor.

4) Panhard rods, watts links, and torque arms may be added, replaced, or modified, and a Modification Factor will be assessed.

5) Non-OEM metallic and/or spherical design replacement suspension bushing modifications on control/camber/toe arms/links, panhard rods, watts links, and torque arms shall be assessed a Modification Factor which is in addition to and additive to #3 & #4 above. (Includes replaced, modified, adjustable, or altered control arm ball joints for roll-center correction or camber/caster adjustment).

6) Non-OEM shocks/struts with an external reservoir (or piggyback) OR with shaft diameter 40mm or greater shall be assessed a Modification Factor.

7) Increase in OEM track width greater than four (4) inches, which may be due to non-OEM axles, control arms, brake rotors/hats, wheel spacers, hubs, wheel offset, and/or camber adjustment shall be assessed a Modification Factor.

## 6.2 Update/Backdate

Any OEM part may be substituted with a non-OEM part that is identical in size, shape, and functional characteristics without a Modification Factor assessment.

Because the definition of “OEM” is 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 vehicle may be updated or backdated with such parts without a Modification Factor assessment (applies to those items that would otherwise be assessed one).

Brake modification exception: The exception to this rule is that brake calipers/brackets and rotor size may be updated or backdated to any generation model of that vehicle, provided that the donor vehicle is eligible for competition in ST5.

When updating or backdating parts, no interchange of parts between assemblies is permitted that would create a new assembly that was never manufactured.

## 6.3 “Adjusted Weight/Power Ratio” Calculation

### 6.3.1 Definitions

1) 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 7.2.

2) All vehicle weights will be measured to the tenth of a pound (xxxx.x), and 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. All horsepower measurements will be rounded off to the nearest whole number, and any number ending in “.50” (xx.50x) or less will be rounded down. Any “Adjusted Weight/Power Ratio” calculation ending in “.995” (xx.995) **or greater** will be rounded up to the benefit of the competitor.

3) “Rear-Mid” engine layout is when the engine is sitting between the driver and the rear axle. “Rear” engine layout is when the engine is on or behind the rear axle, and the center of mass of the engine is behind the rear axle.

### 6.3.2 Modification Factors

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 compliance.

Competition Weight:

Less than:

2850 lbs = -0.1	2450 lbs = -0.4
2650 lbs = -0.2	2250 lbs = -0.5
2550 lbs = -0.3	2150 lbs = -0.6

Greater than:

3300 lbs = +0.1	3500 lbs = +0.3
3400 lbs = +0.2	3600 lbs = +0.4

Tires: **Tires with a UTQG Treadwear rating 100 or greater** = +0.3  
(Note: Any new tire model or upward treadwear revision after 12/10/17 requires NASA approval)

Brakes: Non-OEM, modified or relocated brake calipers/brackets  
 or rotor diameter = -0.2

Suspension: Suspension design utilizing upper “A-arm” or “wishbone”  
 type control arms (front or rear) = -0.7

Replace, modify, or remove control arms, camber arms/links,  
 toe arms/links = -0.5

Add, replace, or modify a Watts link, Panhard Rod, or Torque Arm  
(if added Torque Arm, may remove the rear upper control arms  
 without an additional Modification Factor) = -0.5

Non-OEM metallic and/or spherical design replacement suspension  
 bushing modifications on control/camber/toe arms/links,  
 panhard rods, watts links, and torque arms = -0.2

Non-OEM shocks/struts with an external reservoir (or piggyback)  
 OR with shaft diameter 40mm or greater = -0.7

Increase in track width greater than four (4) inches = -0.7

Chassis:	OEM Body Type 4-door Sedan or 5-door Wagon originally manufactured as a Production vehicle	= +0.2
	One or more cage bars that penetrate the front bulkhead/firewall	= -0.3
Body:	Single, Flat, Horizontal Front Splitter (no greater than 4")	= -0.5
	BTM Aero (see 6.1.4)	= +0.4
	Modification of the OEM roof line/shape and/or windshield/frame removal (convertibles only)	= -0.4
	Modification of the floor pan for exhaust clearance only and/or the rocker panel for side exit exhaust only	= -0.2
Transmission:	OEM street-legal model available paddle shift/DCT/SMG or sequential motorcycle gearbox	= -0.3
	(All classes—no assessment for automatic utilizing torque converter)	
Drivetrain:	AWD	= -0.5
	FWD	= +0.6
	Rear-Mid or Rear engine layout (not Front-Mid)	= -0.4

### 6.3.3 Non-Production Vehicles Approved for ST5

The following non-Production vehicles are approved for use in ST5, **provided that the frame/chassis, body/aero remain in the original manufactured configuration** as specified by the manufacturer (unless designated otherwise below). The “Chassis” Modification Factors and the “Vehicle Body” Modification Factors shall not be assessed, but the vehicle specific Modification Factor listed below for each model will apply. None of these vehicles are eligible for the “BTM Aero” Modification Factor.

#### No Modification Factor Models:

Legends = -0.0 (no additional Aero mods)

Mazda MX-5 Global Cup Racecar = -0.0 (may have additional Aero Modifications, but will be assessed the Modification Factor for front splitter if added)

#### With Modification Factor Models:

(none)

Note: Future “Production” status approved vehicles and any associated Modification Factor will be posted on the [www.nasaforums.com](http://www.nasaforums.com) website or the Super Touring website.

### 6.3.4 Example Calculations

Example: 1998 Mazda Miata, with 2004 Miata brakes, weighing 2405 lbs, with Avg rwhp: 159 rwhp  
 $2405 / 159 = 15.13$  , minus 0.4 (weight), minus 0.7 (A-arms) = 14.01 (ST5)



Example: 1997 BMW E36 M3, with OEM brakes, non-OEM control arms and spherical bushings, weighing 3090 lbs, with Avg rwhp: 210 rwhp  
 $3100 / 210 = 14.71$ , minus 0.5 (arms), minus 0.2 (sphericals) = 14.01 (ST5)

Example: 2007 Honda S2000, with OEM brakes, non-OEM hardtop, spherical bearings, weighing 2940 lbs, with Avg rwhp: 192 rwhp  
 $2940 / 192 = 15.31$ , minus 0.7 (A-arms), minus 0.2 (sphericals), minus 0.4 (hardtop) = 14.01 (ST5)

Example: 2004 Ford Mustang GT, with non-OEM brakes, panhard rod with spherical bearings, front splitter, weighing 3305 lbs, with Avg rwhp: 216 rwhp  
 $3305 / 216 = 15.30$ , plus 0.1 (weight), minus 0.2 (brakes), minus 0.5 (panhard rod), minus 0.2 (sphericals), minus 0.5 (splitter) = 14.01 (ST5)

Example: 2009 Hyundai Elantra (4 door) with motor swap, non-OEM brakes, non-OEM control arms with spherical bearings, cage bars through the firewall, and front splitter, weighing 2700 lbs, with Avg fwhp: 180  
 $2700 / 180 = 15.0$ , minus 0.1 (weight), plus 0.6 (FWD), plus 0.2 (4-door), minus 0.2 (brakes), minus 0.5 (arms), minus 0.2 (sphericals), minus 0.3 (cage), minus 0.5 (front splitter) = 14.0 (ST5)

The online NASA ST/TT Car Classification now also functions as a calculator tool that can be used to assist competitors with these calculations with planning future modifications and builds. <https://supertouring.nasaseries.com/forms-rules/>

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 subtract that number from the 14.0 ratio to get the vehicles actual target Wt/HP ratio. Divide the competition weight by this number to obtain the horsepower target.

Using the 2009 Hyundai Elantra (4 door) example above with motor swap, non-OEM brakes, non-OEM control arms with spherical bearings, cage bars through the firewall, and front splitter, weighing 2700 lbs

$-0.1 + 0.6 + 0.2 - 0.2 - 0.2 - 0.5 - 0.3 - 0.5 = -0.9$   
 $14.0 - (-1.0) = 15.0$   
 $2700 / 15.0 = 180 = 181 \text{ fwhp avg.}$

(Note: Watch for rounding errors that could lead to non-compliance.)

## 7 Dyno Testing

### 7.1 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) should be included in the report (or the competitor must use Maximum HP instead of Avg HP to calculate the Adjusted Wt/HP Ratio). 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 Dyno test with the highest peak horsepower number of the three tests will be used to determine the Average Horsepower (Avg HP) for weight to horsepower calculations.\*\*\*\* 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.)

\*\*\*\* (note: If a competitor chooses not to, or cannot, print out the numerical table of HP in 50 rpm increments, the Maximum Peak HP may be used for Adjusted Wt/HP Ratio calculations)

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 ST Car Classification Form.

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 ST Leader may retain the option to specify which business locations will be the approved centers for that particular region. Please check with the ST Leader 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 ST Leader may require an updated certified Dyno report (at the driver/owner’s expense) after one year from the date of the previous report.

## 7.2 Average Horsepower Calculation

**Any competitor may choose to use Maximum Horsepower instead of Average Horsepower at any time.**

The number used for calculating the Adjusted Wt/HP Ratio 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 in the Adjusted Wt/HP Ratio

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

(note: when using NASA’s calculator tool, Max HP from the 50 RPM data export is acceptable)

The following sixteen (16) data points will be obtained from the Dyno’s 50 RPM data export numeric RPM/HP table printout:

Horsepower at: 250 rpm, 500 rpm, 750 rpm, 1000 rpm, 1250 rpm, 1500 rpm, 1750 rpm, 2000 rpm greater than Max HP rpm

Horsepower at: 250 rpm, 500 rpm, 750 rpm, 1000 rpm, 1250 rpm, 1500 rpm, 1750 rpm, 2000 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.)

7.2.1 For vehicles with a redline greater than 7000 rpm:

The seven (7) highest data points of the above sixteen (16) will be used in the calculation below:

$$\text{Avg HP} = \frac{\text{Max HP} + (\text{sum of the seven highest data points})}{8}$$

7.2.2 For vehicles with a redline between 6000-7000 rpm:

The five (5) highest data points of the above sixteen (16) will be used in the calculation below:

$$\text{Avg HP} = \frac{\text{Max HP} + (\text{sum of the five highest data points})}{6}$$

7.2.3 For vehicles with a redline less than 6000 rpm [and all Forced Induction vehicles](#):

The three (3) highest data points of the above sixteen (16) will be used in the calculation below:

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

### 7.3 Dyno Compliance Inspections

Any vehicle requested to have a Dyno compliance inspection by the Race Director, National ST Series Director, or other NASA official designated by the Race Director, that is unable to complete testing for any reason, is subject to, and likely will be disqualified. At the time of the request for testing, the competitor is responsible and required to provide any special equipment necessary to Dyno test that vehicle model.

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 Regional ST Leader (or National ST Series Director), or Race 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. Prior to the dynamometer inspection the competitor may top off any fluids needed to help 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 Regional ST Leader, ST Series Director, or Race 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 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 may 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 ST Director reviews the data and finds convincing evidence of non-compliance.

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 ST Officials).

At any event where dynamometer testing (or GPS compliance testing) is not available, ST 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, ST Officials may have the vehicle sealed and transported for off-site Dyno testing at a later date.

At events where Dyno testing is available, ST 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 ST 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 ST Director, Regional ST Leader, or Race Director, the Minimum Competition Weight listed on the ST 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.

## **8 Forms, Inspection, Protests, Penalties**

### 8.1 ST/TT Car Classification Forms

In order to accrue points or compete, each year/season, all NASA ST competitors must submit a current year, completed NASA ST/TT Car Classification Form and certified Dyno report to the Regional ST Leader prior to the first qualifying session of a race day. 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 races in the same region. A new ST/TT Car Classification Form and certified Dyno report copy 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 and Dyno reports **must** be **submitted** online here: <https://supertouring.nasaseries.com/forms-rules/> . However, until further notice, competitors **must** also print out the **time-stamped** .pdf version of their submitted form (that will be sent to them by e-mail), and submit it and the Dyno report to their regional ST Leader.

Any ST competitor who has not submitted a completed ST/TT Car Classification Form and certified Dyno report prior to competition will be subject to one or more of the following penalties at the discretion of the Race Director in consultation with the Regional ST Leader:

1) Disqualification from the competition session; 2) Transfer to the Super Unlimited class; 3) Loss of one position place for race results, or moved to the back of its class (or back of the field if gridded by time) in pre-grid after a qualifying session (if the completed ST/TT Car Classification Form and certified Dyno report are submitted immediately upon request post-competition).

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 ST 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 7.3 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 at any time in a higher level class than would be dictated by the “Adjusted Wt/HP Ratio”. A car may be modified an unlimited number of



times (no power output changes during the competition day), and substitute vehicles may be used provided they comply with all ST rules. Substitution of a vehicle after qualifying sessions are completed will result in a new vehicle being placed at the back of its class (or back of the field if gridded by time) in pre-grid for the race.

## 8.2 Vehicle Inspection

All completed ST/TT Car Classification Forms will be available from the Regional ST Leader (or Race Director if there is no Regional ST Leader) for review by any competing driver by request at the track (or posted on-line at the Regional ST Leader's discretion). Super Touring vehicles are subject to detailed inspection by any NASA Technical Inspector and visual inspection by Super Touring competitors at any time when the car is at the track. Super Touring Officials retain the right to request any disassembly or other procedure required to verify vehicle compliance. At random times or at the discretion of the Super Touring Officials, any car may be ordered to report for rules compliance testing on a chassis dynamometer. All Super Touring competitors have the option to be present for official chassis dynamometer testing; however, the printed results of Dyno testing are the property of NASA, and will only be shown to Super Touring Officials, who will let the competitor know whether or not the vehicle was compliant, and may show the competitor the results at their discretion if compliant, and will show the competitor the results if non-compliant. Competitors must comply with any request by ST 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 Super Touring Officials to help verify rules compliance. And, as stated above, GPS monitoring may be used in lieu of Dyno testing when collected data shows convincing evidence of non-compliance.

## 8.3 Protests

Protests of any competitor's vehicle, for good cause, may be filed up to 30 minutes after the completion of a race or qualifying session, with the Race Director. A specific part does not need to be specified in the protest if the protest is about power levels, but an explanation of why the vehicle is being protested is required. 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 vehicle is found to be compliant, the protesting party will forfeit the deposit, and it will be used to pay for the Dyno test. Frivolous and "nuisance" protests may result in some type of action against the protesting party.

## 8.4 Penalties

Serial non-compliance is not welcome and will be subject to harsh penalties. Penalties will be assessed as follows, although the Race Director may choose to assess more severe penalties.

### 8.4.1 Regional

Any car exceeding the minimum "Adjusted Weight/Power Ratio" for its declared class, or otherwise found to be non-compliant with the rules for the declared

class, will be penalized in accordance with the NASA CCR and these rules. The Regional penalty for competing with a vehicle in a class lower than that dictated by the Super Touring classification system or an otherwise non-compliant vehicle, regardless of driver/owner intentions, will be disqualification for the previous race in that region for the first offence. A second offense in the same region will result in loss of half of season points, a one race suspension, and disqualification from the race. At third offense in the same region, there will be a loss of all season points and a four race suspension. Any Regional disqualification or suspension will result in zero points that cannot be dropped.

#### 8.4.2 National

Either the Regional ST Leader or the Regional Race Director will report by e-mail all disqualifications under the above paragraph to the National ST Director, who will maintain a record of all disqualifications for non-compliance with classing rules. The National penalty for any driver disqualified three times in one season (regardless of region) will be revocation of eligibility to compete in the NASA Championships (in any class or series—not just Super Touring). The fourth offense in two seasons (regardless of region) will result in permanent ejection from the ST (and TT & PT) series.

#### 8.4.3 Procedural Violations:

Any Procedural Violation of the rules that is found after a qualifying session, but before a race will result in the vehicle moving to the back of its class (or back of the field if not gridded by class) on the pre-grid. Any Procedural Violation that is found after a race will result in the loss of one position place in the final results. The following are all Procedural Violations:

- 1) Failure to revise or resubmit a Car Classification Form after new assessed modifications have been made
- 2) Incorrectly assessing Modification Factors
- 3) Failure to note all modifications that require Modification Factor assessment
- 4) Failing a Dyno test (over the maximum listed on the Car Classification Form) by any amount
- 5) Incorrectly calculating the Minimum Competition Weight necessary to be legal for the class.

## 9 Vehicle Appearance

### 9.1 Car Numbers and Class Designation

All NASA ST cars must display the car's number on both sides and the front and rear of the car. 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 (4) inches tall for the front and rear. NASA ST 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 ST followed by the group number. For example, an ST5 class competitor would display "ST5" as a class designation. Drivers are also encouraged to place their class designation in contrasting colors on the inside of their front window, so



that a driver in front of them can easily determine in his rear view mirror if the cars are in his class or not. The NASA ST Series Leader may require this additional identifier, especially if there are multiple vehicles competing that are the same model and color, but in different classes.

## 9.2 General Car Appearance

All vehicles must be in good condition and appearance. Vehicles with excessive body damage, primed 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.

## 9.3 Rear Brake Light Requirement

All vehicles shall have at least one functioning rear brake light that is clearly visible during daylight conditions.

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

### **CTSC Tires:**

Continental Tire Sportscar Challenge EC-Dry tires (225, 245 only) are permitted and shall be considered equivalent to DOT approved tires for classing purposes.

### **Ford Mustang and BMW E36 M3:**

"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).

### **Mazda Miata ('90-'05):**

The driver's side floor pan may be modified to accommodate larger/taller drivers. All modification shall be contained between the transmission tunnel, driver's side rocker, rear bulkhead and no more than 24" forward of rear bulkhead. The modification shall not extend below the factory floor stiffener/frame rail. The steel used in the modification shall be no thinner than .060". All modifications shall be welded in place. This modification shall serve no other purpose other than seating position.

A -0.2 Modification Factor will be assessed for this modification.

## **Appendix B—BTM Aero Modification Factor non-BTM approvals**

The following vehicle higher level trim models are approved for the BTM Aero Modification Factor in section 6.3 (note: any BTM rear wing or spoiler must be removed):

BMW E30 M3, E36 M3

BMW E46 non-M ZHP trim level

Ford Mustang GT ('87-'93)

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