

**East Coast Outlaws
HO Slot Car Racing Club**

**2015-2016
Official Rulebook**

Effective March 22, 2016

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Version Log

Version	Modification	Change Identification	Effective Date
V1	Created from 2014 – 2015 Rules with modifications from Rules Meeting	<i>Changes are Bold and Italicized.</i>	8/1/2014

East Coast Outlaws Mission Statement

The East Coast Outlaws is a slot car club. We are dedicated to making HO racing fun for every participant. We do this by having organized procedures, clear rules, and high standards for our racing venues.

Membership

By being a member in the East Coast Outlaws group a person will abide by the rules and spirit of the group.

Membership in the club is renewed every season with the beginning of the season being the annual rules meeting. To be a member in the East Coast Outlaws group a person will pay their membership dues at the annual rules meeting or the first race of the season they attend. If a driver is unable to pay the membership fee, but would like to be a member, they should contact the Club Director. We will not turn someone away due to financial hardship. To be eligible to vote at a rules meeting, a member must have attended at least 4 races during the prior season.

Dues and Race Fees

The annual dues for membership in the East Coast Outlaws is \$20. The fee to participate in an East Coast Outlaws race event is \$10 for anyone in attendance.

Event Host

The person hosting the racing event for the day. The event host is relieved of all marshaling duties for the day. Hosts will set the limit of guests that members can bring. Associate racers such as sons, daughters or relatives are always welcome. If the Communication Director is not able, the Event Host will provide the Club Director with a race Report summarizing the event in a timely manner after the event. The Event Host will be compensated for food and beverage costs incurred up to one half of the entry fees collected on that day.

Club Officers

Director

The director will see to it that all East Coast Outlaws rules are enforced to the letter to ensure fair racing for all members. The club director has the last word on any discrepancy or issue and all club business. This is an elected position with a 2-year term. The election for Director is to be held at the annual rules meeting.

Typically the club director MC's the events on race day. In the event the current club director is not in attendance, a stand-in (former club director, etc.) may direct race proceeding at a race event. Club director should make every effort to be present at club races.

Treasurer

The club treasurer is responsible for all club funds. The treasurer will also submit a financial report at each East Coast Outlaws event for viewing by all members. This is an elected position. The election for Treasurer is to be held at the annual rules meeting.

Tech Inspectors

Tech inspection of the racing equipment prior to and after any race is the responsibility of the Tech Inspectors. There will be three tech inspectors consisting of the officials or active club members at each race. The inspectors will come to an agreement on any rule interpretations via a majority vote among the tech group. The tech inspectors are also responsible for a full understanding of the East Coast Outlaws rules. This is an elected position with a one-year term. The election for Tech Inspectors is to be held at the annual rules meeting.

Communications Director

The Communications Director is responsible for the creation, publication and distribution of the race report for each race. The Communications Director will be responsible for all matters concerning Club communications including managing and moderating the Club's website (www.ecoslotcars.com) and Facebook page. The Communications Director will be responsible for promoting the Club online through web forums, etc.

Scribe

The Scribe is responsible for documenting decisions made at the rules meeting. The document produced is not intended to be a transcript of a meeting but a record of the discussions made. The Scribe will use this information to update the Rulebook for the upcoming season and provide it to the Communications Director for distribution to club members. In addition, the Scribe will maintain the Club records, Race Results, and Attendance records.

2015 – 2016 Officers

- Directors: Russ Upton and Paul Ryer
- Treasurer: Russ Upton
- Communications Directors: John Reimels, Jim Hoar
- Head Tech Inspector: Dave Lockwood
- Tech Inspector: Rick Morrisette
- Tech Inspector: Matt Patrick
- Alternate Tech: Greg Wisniewski
- Scribe: Paul Ryer

Club Rules

Race Schedule

Club race events will be from September through May pending availability of race venues. The annual race event schedule will be posted on the club website (www.ecoslotcars.com). Inclement weather or venue conflicts may postpone events. Please contact the race host prior to departing to an event to assure posted times and locations haven't changed.

General Rules

1. Foul language, aggressive attitudes, or any behavior deemed to be un-sportsman like is not tolerated.
2. Smoking is not permitted inside at any East Coast Outlaws event.
3. Excessive alcohol consumption is prohibited and subject to immediate club action.
4. Eating, drinking, cell phone usage or any distracting behaviors such as loud conversations are not allowed near the track during any racing conditions.
5. If you are signed in as a driver, you must marshal.
6. No substitute drivers.
7. No substitute cars.
8. After a car goes thru the tech procedure, it is impounded.
9. After the tech inspection you may not change body, chassis, bulkhead, armature or magnets.
10. If anything is not specifically stated or addressed in the rules IT IS NOT PERMITTED.

Race Day Rules and Procedures

1. At each event there will be 3 classes raced unless otherwise stated in the race announcement.
2. Race Day Schedule:
 - a. Doors Open at 8:00 AM
 - b. Practice is 8:00 to 9:30
 - c. Tech Inspections is 9:30 to 9:45
 - d. Drivers meeting is 9:45 to 10:00
 - e. First race starts at 10:00
3. Race Format
 - a. Format will be Round Robin with 3-minute heats.
 - b. For each race, drivers will be placed into the lineup in random order**
 - c. Cars can be worked on between heats.**
 - d. There will be a 90 second autorotation time in between heats. This can be overridden on race director's discretion.**
4. Track Specific Procedures:
 - a. Ovals:
 - i. Race format will be "Offs." The number of allowable offs per driver will be calculated as:
 - ii. Total Offs = (2 X number of lanes) -1.
 - iii. Each time a driver de-slots they will be charged 1 off. Once they have reached the total number of offs, they cannot continue racing.
 - iv. There will be a track call each time a car or cars de-slot.
 - b. Road Courses:
 - i. Race format will be "Marshaled." Marshals will be present to return cars to their proper lanes.
 - ii. Track calls will be called for Marshall damage and cars that cannot be located.
 - iii. Cars must have a color-coded lane sticker during the race.

General Equipment Rules

1. The minimum wheelbase of any car is 1-3/8 (1.375) inches.
2. The maximum length of any car is not to exceed 3 (3.00) inches.
3. The maximum lateral movement of the front axle is 1/32 (0.03125).
4. The car must have 4 tires that touch the track.
5. Only one guide pin per car.
6. No tire glue or dressing.
7. Unless otherwise stated in the class rules, any type of controller can be used as long as it does not introduce an increase in voltage or amperage between the power supply and the track.

Track Requirements

1. Track Mate software version 5.0 or newer must be used for timing and scoring. An operating power relay must be in place to turn power on and off for the start and end of the heat and for track calls.
2. Clearly marked driver stations colored to match corresponding lanes with clearly colored controller connections.
3. Clearly colored lanes.
4. Appropriate gauge wiring and wiring for dynamic braking.
5. All plastic tracks must have an apron of similar height on the outside of any turns.
6. An appropriate power supply for the divisions being raced that day.
7. The race table must have an acceptable retaining wall.

Hobby Stocks

Mostly stock T-Jet.

Chassis and Gear plate: Must be the stock Aurora or Model Motoring Thunder Jet Copper. No modifications allowed.

Armature: Only OEM Aurora or Model Motoring 2 lam, minimum of 16 ohms. No modifications.

Motor Magnets: *Magnets shall be manufactured by Aurora and originally supplied with the Thunder Jet chassis. Magnet combinations allowed are green/white, green/orange, black/black and black/ black with white stripe. No tough ones or AFX magnets allowed. AFX magnets can be distinguished by cut marks on the bottom of the magnet. See Appendix A: Magnet Clarification for more details*

Brushes: Stock replacement only. No silver or composite compound brushes. No modifications. Including X-ing or scoring.

Pickup Shoes: Only OEM Aurora, Model Motoring, **or AML**. No BSRT or other performance shoe. No modifications. Movement of shoe must not be restricted.

Rear Axle: Only OEM Aurora or Model Motoring. Max width of axle and mounted rims w/tires=1.125. No modifications. No spacers permitted. **No Dune Buggy or Truck axles allowed.**

Front Axle: Only OEM Aurora or Model Motoring. Max width of axle and mounted rims w/tires=1.125. No modifications. Spacers may be added to the front axle to limit the amount of side-to-side play. **No Dune Buggy or Truck axles allowed.**

Rear Wheels: Any readily available single or double flange rim is permitted. Wheels may be painted but not modified in any other way.

Front Wheels: Any readily available aftermarket single or double flange rim is permitted. Wheels may be painted but not modified in any other way.

Front Tires: **Front tires must be at least .340 inches and no wider than 0.100000 inches. Any readily available slip on tire is allowed.** Mounted tire must not fit through a hole less than 0.340 on OUTLAWS owned BSRT metal tire gauge. Tire width must not exceed the width between flanges or between flange and outside of wheel. No O-ring tires allowed. ALL TIRES MUST BE BLACK

Rear Tires: Any readily available aftermarket slip-on silicone rear tire with a minimum diameter of .350 and no wider than 0.100000 inches. Mounted tire must not fit through a hole less than 0.350 on OUTLAWS owned BSRT metal tire gauge. ALL TIRES MUST BE BLACK.

Pick Up Springs: Any stock or stock replacement pick-up shoe springs for T-Jets. No modifications.

Guide pin: Any stock or stock replacement guide pin. **Guide pins may glued and hole may be chamfered.** No flag guide pins.

Gearing: Only OEM Aurora or Model Motoring. A 14-tooth armature pinion and 24-tooth idler and driven gears. Rear end gears must be 9-tooth drive pinion with 15-tooth crown gear. Gears may be polished to provide smooth mesh but cannot be drilled, tapered, or altered.

Bodies: American made 2 doors from 1940-1975. Mid and full size cars only. No compacts, Corvettes, or Pony cars. The body must completely cover the chassis when viewed from above except for legal openings, i.e. windows. After trimming of glass in order to lower the body the full windshield glass must remain in place. Side **and rear** glass may be removed. Each body must have OEM equipped bumpers. Body may be lowered but not lightened. Fender wells may not be cut for tire clearance. **When viewed from the side, the gear plate must not break the plane of the trunk.** The body must be T-Jet, J/L, Auto World or any hard body, non-resin reproduction. Two screws must be used to mount the body to the chassis and may be ground down. Hardtop cars such as Fairlanes, Galaxies etc., may remove the interiors. If you are unsure if a body is legal, check with tech inspectors prior to the race.

Track Power: Races shall be run at 18.0 volts +/- 0.25 volts.

Coupes

The coupes division is a New England favorite. This division is based upon the early modifieds that would run at all the local short tracks all summer long. The rules for this division are quite liberal allowing almost any modification that will not affect the magnets ability to provide traction. Look for some of the best-looking cars in this division.

Width: The complete car must freely pass through a standard 1.3125 (1 and 5/16) HO tech block.

Chassis And Gear Plate: Any non-magna-traction chassis and gear plate from the following manufactures:

- Aurora ThunderJet, Wild Ones, Tuff Ones, AFX
- Johnny Lightning
- Auto World
- DASH

Weight pans are allowed

Armature: No restrictions.

Motor Magnets: Ceramic only. Magnets may be shimmed with non magnetic material.

Brushes: No restrictions.

Pickup Shoes: No restrictions.

Rear Axle: No restrictions.

Front Axle: No restrictions.

Rear Wheels: Rear wheel and tire must not pass through the .448" gauge hole on the Outlaws owned BSRT metal tire gauge.

Front Wheels: Must be deep dish. This includes, but is not limited to, Tyco 440 X2 front wheels, AFX steelie and AFX turbine front wheels, and JW's HO Speed Parts part number JW F17-TG. Front wheel and tire must not pass through the .348" gauge hole on the Outlaws owned BSRT metal tire gauge.

Tires: Front tires must be minimum of 3/16 in width. Rear tires for the AFX must be slip on silicone only. No restrictions for the Johnny Lightning and Aurora Chassis.

Pick Up Springs: No restrictions.

Guide Pin: No restrictions.

Gearing: No restrictions.

Bodies: Any NASCAR Modified that competed prior to and including 1975. Bodies can be hard body (injected molded or resin) or lexan (vacuum molded) as long as the body is aesthetically acceptable and true to class as determined by majority vote of members present at that race.

Track Power: Races shall be run at 18.0 volts +/- 0.25 volts.

Magnatraction

AFX and X-Traction cars with some different flavor bodies.

Width: The complete car must freely pass through a standard 1.3125 (1 and 5/16) HO tech block.

Chassis: Only the AFX Magnatraction and the Johnny Lightning or Auto World X-traction Chassis are legal. No modifications are allowed.

Armature: Stock armature only minimum 14 ohm. No modifications.

Motor Magnets: OEM ceramic magnatraction or X-Traction magnets in their original position. ***Magnets may be shimmed using non-ferrous materials only.***

Brushes: ***Stock or Stock Replacement brushes allowed.*** No substitutes such as springs. Brushes must be used. X-ing or scoring of brushes is allowed.

Pickup Shoes: Any stock replacement.

Rear Axle: Any.

Front Axle: Any.

Front Wheels and Tires: Any.

Rear Wheels and Tires: Any tire and wheel combination. Slip on silicone tires only.

Pick Up Springs: Any stock replacement.

Guide Pin: ***Stock or Stock replacement***

Gearing:

- Top gearplate gears and pinion must be Only OEM Aurora or Johnny Lightning. A 14-tooth armature pinion and 24-tooth idler and driven gears. Rear end gears must be 14-tooth drive pinion
- ***Stock or Stock Replacement 15-tooth crown gear. Shims may be used to adjust mesh or crown gear.***
- Gears may be polished to provide smooth mesh.
- JL/Auto World drive gear rivet may be replaced with JW part#X15 screw or similar but cannot be drilled, tapered, or altered.

Fairgrounds Bodies: Any American manufacturer 2-door hardtop manufactured between 1953 and 1975. Bodies may be lowered. Glass bumpers and grills are not required. No Corvettes. Body must be a hard body (injection molded or resin).

NASCAR Bodies: ***Body style must have been raced in NASCAR Grand National series. Only injected molded bodies intended for A/FX, Johnny Lightning, or Auto World, chassis are allowed. Must retain original glass, wings, bummers and grills.***

IMSA Bodies: IMSA and SCCA bodies from the 70s and 80s such as the Capri, Datsun 240Z and 510, BMW 320i, etc. Only injected molded bodies intended for A/FX, Johnny Lightning, or Auto World, chassis are allowed. Must retain original glass, wings, bummers and grills.

Can-AM Bodies: Open cockpit bodies from the late 60s and early 70s such as the McLaren, Porsche 910, Ferrari 312, etc. No closed cockpit bodies. Only injected molded bodies intended for A/FX, Johnny Lightning, or Auto World, chassis are allowed. Must retain original glass, wings, bummers and grills.

Sports Prototype Bodies: Closed cockpit bodies such as the Porsche 917, Ferrari 512, GT40, etc. Only injected molded bodies intended for A/FX, Johnny Lightning, or Auto World, chassis are allowed. Must retain original glass, wings, bummers and grills.

Track Power: Races shall be run at 18.0 volts +/- 0.25 volts.

Limited Super Stock

An east coast favorite. This chassis support's several body options to allow for some variety in body choice.

Width: Max width of axle and mounted rims w/ tires = 1.3125 (1 and 5/16) to be checked using a tech block.

Chassis: Only the Aurora, Model Motoring, Johnny Lightning/AW, and DASH T-Jet style chassis are legal. ***Idler gear post may be squished.*** No other modifications are allowed.

Armature: Stock armature only. Armature must match the manufactures chassis being used min 14 ohm. No modifications.

Motor Magnets: Ceramic only in their original position. Shims permitted.

Brushes: ***Any flat top and bottom carbon/copper motor brushes are allowed. Brushes may be scored with one score line or an X. Brush Tensioners may be slightly "dimpled" to prevent brush spinning. No exaggerated deep cuts or crevices allowed; this will be checked for at tech.***

Pickup Shoes: ***Stock or Stock Replacement. Ski shoes such as Magnatraction shoes or BSRT 502 shoes are not allowed.***

Rear Axle: Any.

Front Axle: Any.

Front Wheels and Tires: Any.

Rear Wheels and Tires: Any.

Pick Up Springs: Stock or stock replacement.

Guide Pin: ***Any stock or stock replacement guide pin. Guide pins may glued and hole may be chamfered.***

Gearing: 14-tooth armature pinion, 24-tooth idler and driven gears. Rear end gears: Any rear pinion/crown gear combination (stock or stock replacement). OEM on all other gear plate parts. Gears may be polished to provide smooth mesh but cannot be drilled, tapered, or altered. A shim may be used on the idler gear of the JL/Auto World chassis.

NASCAR / NASTRUCK Bodies: Hard shell injection molded or resin cast NASCAR style 1990 to present. Must have front and rear glass. Wheels must not be visible when viewed from above. Body must be mounted with 2 screws. Tires must be fully visible when viewed from the side. Rocker panels must be intact. BRP NASCARZ are legal.

Trans-Am Bodies: Hard shell injection molded or resin cast body that represents a make and model that competed in the Over 2liter classes from 1966 – 1972. Must have front and rear glass. Body must be mounted with 2 screws. Tires must be fully visible when viewed from the side. Rocker panels must be intact. Eligible cars include, but are not limited to, Camaros, Mustangs, Javelins, Cougars, Barracudas, and Darts.

Track Power: Races shall be run at 18.0 volts +/- 0.25 volts.

Grand National (ECHORRS Nostalgia, +/-)

The intent of the class is to pay homage to the great racecars from the 1955-1975 NASCAR Grand National era while maintaining commonality of race classes with other prominent east coast slot car clubs.

Rules for this class are identical to the latest published ECHORRS Nostalgia Rules with addition of a specific body style/appearance, wheels, and tires as indicated below. With the exception of the Outlaws twist on body style/appearance, wheels, and tires, the most current version of the ECHORR Nostalgia rules will be recognized.

The URL for the nostalgia class on the ECHORR site is <http://www.echorr.com/nostalgia-rules.html> and as seen below. Please note all Outlaw specific exceptions to the rules marked in **Bold**. ECHORR Rules provided here were effective 8/15/2013.

Cars – General

1. Each racer may have only one car pre-inspected for the entire **Outlaw Grand National** Class event. After a car has been inspected for an event, there shall be no substitutions or replacements. The only exception to the substitution/replacement rule is where, in the judgment of the Tech Committee member(s) present at the time, extreme circumstances are present, such as where a car becomes physically unfit for participation. Such a decision lies within the sound discretion of the Committee member(s) and is final.
2. There is no weight limit for the fully assembled Outlaw Grand National Class car.
3. Cars should pass freely through the Official Tech Block: 1-1/8" (1.125").
4. Wheels and tires may protrude outward of the body.
5. Every component on the car shall meet the "On Market" requirement.

Bodies

1. **All bodies to specifically replicate 1955-75 NASCAR Grand National car/drivers only.**
2. Bodies must be manufactured by either the process of casting or injection molding and be made of resin or plastic. No feather-light resin allowed. The minimum weight with 2 body screws is 2.4 grams.
3. Bodies may be lowered and lightened as long as the minimum weight requirement is met.
4. Bodies that have a separate roof and windshield casting/molding, and have molded-in interiors, also known as Hardtops, may completely remove the interior portion of the body as long as the minimum weight requirement is met.
5. Bodies must be **replicate car as it was raced in the NASCAR Grand National series.**
6. Bodies must contain the original two screw posts. The original position of screw posts must remain intact and shall not be relocated to suit a different setup or wheelbase. Further, the posts shall be included and designed as part of the body specifically for mounting to an Aurora Thunder Jet Chassis. Body posts may be repaired with plastic material only.
7. Body must be fastened securely to the chassis using two screws.
8. OEM wheelbase must be maintained.
9. Windows must completely fill window opening in the front **and rear. Windows must be fashioned out of injection-molded plastic, resin or be vacuum formed and must fill the complete front and rear windshield cavities.**
10. No Indy style Formula 1 or Formula style open-wheel bodies will be allowed.
11. Wheel wells may be ground down for tire clearance only and must not distort the general appearance of the car.

Chassis

1. Chassis shall be stock Aurora Thunder Jet with all copper components.
 - a. Solid rivet chassis may have brass or silver color rivets, any original combination is allowed.
2. Brush springs shall not be modified in any way. They may be adjusted only in their original configuration to change the tension on the brushes.
3. Guide pins shall be original design, must use a full guide pin, guide pin hole may be countersunk for body screw. They shall not be metal.
4. Guide pins may be glued to chassis.
5. Guide pins may be shortened in length to accommodate different tracks.
6. Two mounting screws shall be used to hold the body securely on the chassis.
7. The gear plate clamp may be bent (but not cut or otherwise altered) to improve fitment.
8. NO trimming of the top gear plate shall be allowed.
9. Idler gear post may be squished.

Pickup shoes and springs

1. Pickup shoes shall be solid copper and manufactured by Aurora, Model Motoring or American Line.
 - a. Springs must be original Aurora, American Line, Model Motoring, BSRT (t-jet springs only) or Dr. Oogan, Wizzard and Champ.
2. Pickup shoe springs may be cut (coils removed) to desired length.
3. Pickup shoe springs may be stretched to desired length.
4. The pickup shoe may be bent, but only for the purposes of adjusting the original contact area to accommodate different rail heights of the various tracks.
5. Pickup shoe travel may only be adjusted by:
 - a. bending the front "window" portion of the shoe that hooks to the front of the chassis
 - b. bending the rear hook which attaches to the chassis' copper hardware
 - c. bending the hangers on the chassis into which the rear hook of the shoe connects
 - d. by using tape or heat shrink tubing on the front window of the shoe
6. The window of the shoe cannot be part of the contact patch.

Magnets

1. Magnets shall be manufactured by Aurora and originally supplied with the Thunder Jet chassis. No tough ones or AFX magnets allowed. AFX magnets can be distinguished by cut marks on the bottom of the magnet.
2. Magnet combinations allowed are green/white, green/orange, black/black and black/ black with white stripe. No tough one or AFX magnets allowed.
3. Magnets may be shimmed using non-ferrous materials only.
4. Magnets may be matched.
5. All paint on magnets shall have original factory paint. There shall be no substantial removal of paint. In the event of paint shortage on the magnets, they will be compared to magnets in the official tech kit and if still in question they will be measured for strength against like magnets by the designated measuring tool for the event.
6. Painting of magnets shall not be allowed.
7. No "reversed zapped" magnets.
8. Magnets may not be sanded at all in this class.
9. **See Appendix A: Magnet Clarification for additional information.**

Armatures

1. Only original, stock armatures, with gray tips shall be allowed.
2. Armatures shall average 16 ohms or greater across all poles.
3. Armatures may be balanced, but not trued. The use of glue between comm plate gaps is not allowed in this class.
4. No Hand Wound or rewound or de-wound armatures allowed. The tech committee will have privy to comparative arms and other hand wound detecting tools to make an intelligent decision on a case-by-case basis.
5. Shims between the armature and top plate are not allowed.

Commutator Brushes

1. Commutator brushes shall be manufactured of a copper/carbon compound.
2. Both the top and bottom surfaces shall remain flat.
3. Replacement brushes must meet ECHORR required "On Market" definition requirements.
4. Commutator brushes may be lightly scored to prevent rotation.
5. No "dimpling" of the brush tensioners allowed.

Gears

1. The armature pinion, idler gear and driven gear shall be brass, with a minimum thickness of .046
2. The armature pinion gear shall have 14 teeth.
3. The idler gear shall have 24 teeth.
4. The driven gear shall have 24 teeth.
5. The final pinion shall have 9 teeth.
6. The Crown gear shall have 15 teeth and must maintain its original shape, no re-shaping of the gear boss, 4 gear specialty chassis crown gears are not allowed.
7. The Crown gear shall not be metal.
8. The Crown gear shall not be shimmed.
 - a. **The Crown gear minimum diameter will be no less than .300 inches.**
9. Gears may be soldered or glued to their respective shafts. Gear shafts will be magnetic.
10. Gears may be lapped and/or polished. They shall not be beveled.
11. Shims between the gears and top plate are not allowed.

12. Hollow cluster shafts are not allowed.
13. Plastic top gears are not allowed.

Tires/Wheels/Axles

1. **The only front/rear wheel/tire combo permitted in the Outlaws Grand National class are the Mopar Xwide Stock .350" Black tires and the CNC Delrin rims for Mopar Mountain Tires from Balls Out Racing or the RT-220 rims and RT-225 tires from RT-HO. Links to the specific parts on the website are:**
 - a. <http://ballsoutho.webs.com/apps/webstore/products/show/2553794>
 - b. <http://ballsoutho.webs.com/apps/webstore/products/show/1701575>
 - c. <http://ballsoutho.webs.com/apps/webstore/products/show/2234519>
 - d. <http://rt-ho.com/wheels.html>
2. All tires shall be equal to or greater than **0.348"** diameter and a maximum width of **0.225"**.
3. Tires may be made of silicone.
4. Recoating of the tires is not allowed, this will be looked at carefully during pre-tech.
5. Spacers or springs shall be kept on the outer side of the chassis.
6. Spacers shall be made only of plastic, copper, aluminum, brass, or steel. (Outside diameter cannot exceed 0.125 +/- .005)
7. No wheel weights or hubcaps of any kind allowed on rear end.
8. Axles shall not exceed 1-1/8" in length. Any axle may be used.
9. All four tires shall simultaneously touch the test track in the static position.
10. Lateral movement of the front tire/axle assembly shall not exceed 1/32" (.03")

Controllers

1. Any type of nonadjustable or adjustable (OHM value only) controller is permitted.
2. Any type of controller is permitted as long as it passes tech.
3. Additional electronics on controllers for changing OHM value is permitted.
4. Additional electronics or hardware on controllers for changing any type of output power to the car such as power to run the car when track power is cut are not permitted.
5. Additional electronics or hardware on controllers for changing any type of brake adjustment are not permitted.
6. Additional electronics or hardware on controllers enabling "coast" or "autopilot" features where power is supplied to the car when the trigger is fully released by the operator are permitted.
7. ECHORR tracks are not wired for brakes, thus only a two-wire hook up is necessary.
8. Any controller or replacement parts must meet the ECHORR defined "On Market" requirements.

Track Power

1. Races shall be run at 20.0 volts +/- 0.25 volts.

No "one of" Parts allowed on the cars.

A Final Rule: If anything is not specifically stated or addressed in the above rules it is NOT permitted. If you are unsure of how a rule might apply to you and it's "spirit and intent" check with tech inspectors prior to the race.

Driver/Car Selection

1. ***There will be no driver reservation list. At each race, driver/car combo will be determined as people sign in. If someone signs in before you with the same body you will need to switch to a different body.***

ECHORR Super Stock (SS)

This is the East Coast version of the famous Fray cars that are popular on the West Coast. This is a highly competitive division featuring many of the country's best builders and racers. The East Coast HO Outlaws Club will maintain a small stable of competitive cars for members to use at any event that runs the ECHORR SS class.

Rules for this class are identical to the latest published ECHORRS SS Rules. The most current version of the ECHORR SS rules will be recognized. The URL for the SS class on the ECHORR site is <http://www.echorr.com/ss-rules.html>. ECHORR Rules provided here were effective 8/15/2013.

Complete Car Regulations

1. The complete car must weigh at or between 19.0 grams and 24.0 grams.
2. The complete car must freely pass through a standard 1.3125 (1 and 5/16) HO tech block.

Body Regulations

1. Body: The body must be a copy of a 1:1 car and concept cars.
2. Bodies must be manufactured by either the process of casting or injection molding and be made of resin or plastic. No feather-light resin allowed.
3. Bodies must be originally manufactured with the intention of being mounted with the use of two (2) screws via two (2) body-mounting posts on a/an: Aurora Model Motoring (which includes: Vibrator, Thunder Jet, Wild Ones, Tough Ones and Xlerators), Bachmann, Faller, Model Motoring Thunder Plus, Marx, Eldon or Tyco S series HO chassis.
4. Bodies with cast-in handling pans or exaggerated details - such as unrealistic or inappropriate hood scoops, oversized windows, side pipes, sloped sides, or snow plow noses - are not allowed.
5. No Indy style Formula 1 or Formula style open-wheel bodies will be allowed.
6. No ballast or fillers, other than color pigment, are allowed in the plastic or resin.
7. Maximum overall body width is 1.200. Accordingly, the body must pass through our 1.2 body-tech device. The maximum thickness of the lower portion of the body, including items such as the front end, rear end, fender flares, and running boards must not exceed 0.125.
8. With the body mounted securely to the chassis and viewed from above, the body must cover the chassis except through windows and vents. Unrealistic overly large windows and vents are not allowed.
9. With the body mounted securely to the rolling chassis and when viewed from the rear window opening, the upper edge of the top-plate, minus rails, cannot be above the top of the body as measured at the rear window opening.
10. Bodies must be fitted with all of the manufacturers original or exact-replica bumpers, heads, rollover bars, etc. in their stock locations.
11. Cracked or broken body-mounting posts may be repaired or replaced with the use of glue and/or a plastic sleeve around the original post or a plastic rod/tube in place of the broken post.
12. Other than the plastic post reinforcements, stated in Body Rule 11, no additional weight may be added to the body.
13. The body may be lowered and lightened by removing material through the process of grinding or scraping as long as Body Rule 9 is not violated. Bodies cannot be heated or reshaped from the original cast of the body.
14. Bodies that have a separate roof and windshield casting/molding, and have molded-in interiors (also known as Hardtops, e.g. Aurora's '65 Mustang), may completely remove the interior portion of the body.
15. Front and rear wheel wells may be opened up for tire wheel well clearance. This opening may be no larger than a 1/8-inch drill bit (.125") around the entire wheel well and tire.
16. Wheel wells must not be modified in such a way as to allow the use of any other wheelbase than that which was originally intended by the manufacturer of that body.
17. Any mounting screw may be used. Non-magnetic screws are recommended so that a loose screw will not be picked up by a passing car, thus causing damage to the car and/or the track.
18. Both front and rear screws must be used and must secure the body to the chassis at all times.
19. The front windshield must be plastic or resin, clear or painted, may be glued in place or molded in, and must fill the frame. Tape windshields are not allowed. Side and/or rear windows may be removed. Rear windshields are optional, but must adhere to this same rule if used. Windshields made from Testor's Window maker are not allowed.

Thunder Jet Rolling Chassis Assembly Regulations

1. Only original Aurora Thunder Jet chassis assemblies with non-plated copper electrical components are allowed, including silver color solid rivets, after market rivets are not allowed. Commutator brush springs may be bent to alter brush tension. Pickup shoe hanger plates may be bent.
2. The rolling chassis axle, armature, and drive pinion shaft holes may be opened up slightly for increased clearance.
3. The Truck hole cannot be utilized in any way.
4. The rolling chassis assembly must not be fitted with bushings.
5. The chassis may be trimmed slightly (no more than .010) to allow for crown gear tooth clearance.
6. Gear plate rails may be cut or sanded only for purposes of lowering the body, and shall only be cut or sanded to the level of the top surface of the gear plate. Rails must remain entirely under the gear plate clip.
7. Brush springs may be adjusted only in their original configuration to change the tension on the brushes. They may be dimpled or a corner may be altered only to prevent the brush from spinning.
8. Guide pins shall be original design, must use a full guide pin, guide pin hole may be countersunk for body screw. No metal guide pins.
9. Guide pins may be glued to chassis.
10. Guide pins may be shortened in length to accommodate different tracks.
11. The gear plate clamp may be bent (but not cut or otherwise altered) to improve fitment.
12. Squishing of the idler post is permitted.
13. Hollow cluster shafts are not allowed and must be magnetic.

Armatures

1. Only an original Aurora T-Jet pancake gray armature with a maximum of two laminations, with its original Commutator, and all of its original unmodified windings may be used. The armature may be balanced and trued. The use of glue between comm gaps is allowed in this class. Shims between the armature and top plate are not allowed.
2. Each armature pole is to be measured across two separate Commutator segments. The AVERAGE of all three poles must be 16 ohms or greater. i.e.: Pole A measures @ 15.8 ohms, Pole B measures @ 16.2 ohms and Pole C measures @ 16.0 ohms. This armature is LEGAL. All measurements are to be taken at the current available room (ambient) air temperature. The warming of either the Commutator or the armature is not allowed before/during measuring. (The combined total ohm reading of all three armature poles must equal or exceed 48 ohms.)
3. Any flat top and bottom carbon/copper motor brushes are allowed. Brushes may be scored with one score line or an X. Brush Tensioners may be slightly "dimpled" to prevent brush spinning. No exaggerated deep cuts or crevices allowed; this will be checked for at tech.
4. *No Hand Wound or rewound or de-wound armatures allowed.* The tech committee will have privy to comparative arms and other hand wound detecting tools to make an intelligent decision on a case-by-case basis.

Gears

1. Only stock T-Jet or commercially available stock replacement 14 tooth brass armature pinion gears are allowed.
2. Only stock T-Jet or commercially available stock replacement 24 tooth brass idler and driven gears are allowed.
3. Only stock T-Jet or commercially available stock replacement 9, 12 or 14 tooth brass drive-pinion gears are allowed.
4. Only stock T-Jet or commercially available stock replacement 15 tooth crown gears are allowed. The crown gear boss may be trimmed; spacer(s) may be added to adjust for proper gear mesh within the crown gear box. You can add a small delrin retainer to either side of the rear axle for the purpose of adjusting crown gear mesh with the rear pinion. The diameter of the delrin retainer must not exceed 0.125" with a thickness not to exceed 0.070". 4 gear specialty chassis crown gears are not allowed.
 - a. Minimum gear thickness shall be .046".
5. The Crown gear shall not be metal.
 - a. The Crown gear minimum diameter will be no less than .300
 - b. No Chamfering or beveling of the crown gear, must maintain 90 degree angle as originally produced.
6. The crown gear "boss" may be sanded or trimmed to accommodate different gear ratios.
7. The crown gear may be shimmed inside and/or outside the chassis.
8. Gears may be soldered or glued to their respective shafts.
9. Only metal driven-gear shafts may be used. The driven-gear shaft must not exceed .065" in diameter.
10. Gear-tooth friction surfaces can only be de-burred by polishing, filing, or sanding.
11. Gears must not be chamfered, lightened, or relieved.
12. 10 and 11 tooth pinion gears are not allowed.
13. Plastic top-plate gears are not allowed.
14. *Shims between the gears and the top plate are not allowed.*

Magnets

1. Aurora Super II (Yellow and blue), Johnny Lightning, Auto World or DASH magnets may be used. The magnets may be sanded to fit the chassis. The distance between the magnets must be a minimum of .700"; no exaggerated sanding is allowed to close the armature gap. This will be teched using our custom-designed, specially fabricated Plug.
 - a. Inside surface of magnets may not be sanded.
2. Magnets shall not be affixed to the chassis by any means.
3. All magnets shall have original factory paint. In the event of paint shortage on the magnets, they will be compared to magnets in the official tech kit and if still in question they will be measured for strength against like magnets by the designated measuring tool for the event.
4. Painting of magnets shall not be allowed.
5. Spacing between magnets shall be no less than .700.
6. Magnet shims may be used as long as they are made of non-ferrous material. No shims are allowed either under or on top of the magnets.
7. No "reversed zapped" magnets

Pickup Shoes and springs

1. Pick up shoes and springs shall be solid copper and manufactured by Aurora, Model Motoring, American Line, BSRT (model 504 only) Slot Tech or Wizzard, Champ and Dr. Oogan springs are legal. Ski shoes are not allowed.
2. Pick up shoe springs may be cut (coils removed) to desired length.
3. Pick up shoe springs may be stretched to desired length.
4. The "step" in the pick-up shoe must remain intact and be unaltered, except that only the first bend in the step, (Bend #2), may be changed slightly so that proper "pick-up shoe" to "rail" contact can be achieved. No attempts to "flatten" the "step" are allowed. The area between (Bend #1) and (Bend #2) may be "flattened" to achieve better contact with the "rails"; however, (Bend #1) must remain as stock. (Bend # 1) may be adjusted back toward the chassis to allow the shoe to hang on the chassis nipple. The front vertical slotted portion of the pick-up shoe may be bent to limit shoe travel. The rear hook portion of the pick-up shoe may be bent to limit shoe travel and adjust shoe tension. The chassis' copper pickup retainer may be bent slightly to improve electrical contact.
5. Pick up shoe travel may only be adjusted by:
 - a. bending the front "window" portion of the shoe that hooks to the front of the chassis
 - b. bending the rear hook which attaches to the chassis' copper hardware
 - c. bending the hangers on the chassis into which the rear hook of the shoe connects
 - d. adding heat shrinkable tubing to the top of the front window.
6. Shims may be used between the pickup shoe spring and chassis.
7. The window of the shoe cannot be part of the contact patch. We understand that some of the new DASH PU shoes are bent so that the window slightly becomes part of the contact patch, these will be evaluated on a case by case basis.

Tires/Wheels/Axles

1. Rear wheels may not be made of Brass or solid Delrin.
2. No axle weights, wheel weights or hub caps allowed on rear axle or inside the wheels.
 - a. Note: A small delrin retainer will be allowed on the outsides of rear axle for the purpose of adjusting crown gear mesh rear pinion. The diameter of the retainer must not exceed 0.125" with a thickness not to exceed 0.070".
3. Spacers shall be made only of plastic, copper, aluminum, brass, or steel. (Outside diameter cannot exceed 0.125).
4. All four tires shall simultaneously touch the test track in the static position.
5. The width of the fully assembled tire/wheel/axle assembly shall not exceed 1 and 5/16".
6. Lateral movement of the front tire/axle assembly shall not exceed 1/32" (.03")
7. Spacers may be used on the rear axle both inside and outside the chassis.
8. The front and rear axle diameter must not exceed .065
9. All on market weighted Front Ends are legal, i.e. Zommin Motorsports, RTHO, Wizzard *OS3*, and BRP.
10. No mixing and matching of front end parts from different manufacturers. This does not apply to tires and o-rings.

Controllers

1. Any type of nonadjustable or adjustable (OHM value only) controller is permitted.
2. Any type of controller is permitted as long as it passes tech.
3. Additional electronics on controllers for changing OHM value is permitted.
4. Additional electronics or hardware on controllers for changing any type of output power to the car such as power to run the car when track power is cut are not permitted.
5. Additional electronics or hardware on controllers for changing any type of brake adjustment are not permitted.
6. Additional electronics or hardware on controllers enabling "coast" or "autopilot" features where power is supplied to the car when the trigger is fully released by the operator are permitted.
7. ECHORR tracks are not wired for brakes, thus only a two-wire hook up is necessary.
8. Any controller or replacement parts must meet the ECHORR defined "On Market" requirements.

Track Power

1. Races shall be run at 20.0 volts +/- 0.25 volts.

No "one of" parts allowed on the cars.

A Final Rule: If anything is not specifically stated or addressed in the above rules it is NOT permitted.

ECHORR Indy/Jalopy

Indy style open wheel cars have been a favorite among racers since Aurora 1st made them in 1963. This style open wheel chassis is used for both Indy and Jalopy classes. Rules for this class are identical to the latest published ECHORRS Indy Rules. The most current version of the ECHORR Indy rules will be recognized. The URL for the Indy class on the ECHORR site is <http://www.echorr.com/indy-rules.html>. ECHORR Rules provided here were effective 8/15/2013.

Cars – General

1. Each racer may have only one car pre-inspected for the entire ECHORR Indy Class event. After a car has been inspected for an event, there shall be no substitutions or replacements. The only exception to the substitution/replacement Rule is where, in the judgment of the Rules Committee or Tech Committee member(s) present at the time, extreme circumstances are present, such as where a car becomes physically unfit for participation. Such a decision lies within the sound discretion of the Committee member(s) and is final.
2. There is no weight limit for the fully assembled ECHORR Indy Class car.
3. Cars should pass freely through the Official Tech Block: 1 5/16" (1.3125") width.
4. Every component on the car shall meet the "On Market" requirement.

Indy Bodies

1. Bodies shall be injection molded plastic when using original Aurora, Atlas, Tyco, etc. or resin cast (no feather light resin allowed) based on original Indy or GP car.
2. Bodies may be lightened but must meet the minimum weight requirement with 2 screws of 3.0 grams.
3. Bodies must be complete with full windows, drivers, roll bars and other accessories that accompanied the car as originally manufactured.
4. Bodies must contain the original two screw posts. The original position of screw posts must remain intact and shall not be relocated to suit a different setup or wheelbase. Further, the posts shall be included and designed as part of the body specifically for mounting to an Aurora Thunder Jet Chassis.
5. Body must be fastened securely to the chassis using two screws.
6. There shall be no substitute materials for original injection molded plastic windows used by Aurora, Atlas, Tyco, etc. Resin cast bodies must have glass comparable in thickness to original bodies.
7. Drivers are required in all cars.

Jalopy Bodies

1. Bodies shall be injection molded plastic when using original Aurora, Atlas, Tyco, etc. or resin cast (no feather light resin allowed) based on dirt track cars.
2. Body should have that old timey look.

Chassis

1. Chassis shall be stock Aurora Thunder Jet with all copper components. Silver colored rivets on solid rivet chassis are allowed.
2. Brush springs shall not be modified in any way. They may be adjusted only in their original configuration to change the tension on the brushes.
3. Guide pins shall be original design, must use a full guide pin, guide pin hole may be countersunk for body screw.
4. Guide pins shall not be metal.
5. Guide pins may be glued to chassis.
6. Guide pins may be shortened in length to accommodate different tracks.
7. Two mounting screws shall be used to hold the body securely on the chassis.
8. The gear plate clamp may be bent (but not cut or otherwise altered) to improve fitment.
9. The gear plate rail shall not be cut or altered.
10. Squishing of the idler post is permitted.

Pickup shoes and springs

1. Pickup shoes and springs shall be solid copper and manufactured by Aurora, Model Motoring or American Line, BSRT (model 504 only) Slot Tech or Wizzard. Dr. Oogan, Wizzard, Champ and BSRT t-jet springs are legal.
2. Pickup shoe springs may be cut (coils removed) to desired length.
3. Pickup shoe springs may be stretched to desired length.
4. The pickup shoe may be bent, but only for the purposes of adjusting the original contact area to accommodate different rail heights of the various tracks.
5. Pickup shoe travel may only be adjusted by
 - a. bending the front "window" portion of the shoe that hooks to the front of the chassis
 - b. bending the rear hook which attaches to the chassis' copper hardware
 - c. bending the hangers on the chassis into which the rear hook of the shoe connects
 - d. by using tape or heat shrink tubing on the front window of the shoe
6. The window of the shoe cannot be part of the contact patch. We understand that some of the new DASH PU shoes are bent so that the window slightly becomes part of the contact patch; these will be evaluated on a case-by-case basis.

Magnets

1. Magnets shall be manufactured by Aurora and originally supplied with the Thunder Jet chassis. No tough ones or AFX magnets allowed.
2. Magnet combinations allowed are green/white, green/orange, black/black and black/ black with white stripe, No tough one or AFX magnets allowed.
3. Magnets may be shimmed using non-ferrous materials only.
4. Magnets may be matched.
5. All paint on magnets shall have original factory paint. There shall be no substantial removal of paint. In the event of paint shortage on the magnets, they will be compared to magnets in the official tech kit and if still in question they will be measured for strength against like magnets by the designated measuring tool for the event.
6. Painting of magnets shall not be allowed.
7. No "reversed zapped" magnets.
8. Magnets shall not be sanded at all in this class.
9. **See Appendix A: Magnet Clarification for additional information.**

Armatures

1. Only original, stock, with gray tips shall be allowed.
2. Armatures shall measure an average of 16 ohms or greater across the poles.
3. Armatures may be balanced but not trued. The use of glue between comm plate gaps is not allowed in this class.
4. Shims between the armature and top plate are not allowed.
5. No Hand Wound or rewound or de-wound armatures allowed. The tech committee will have privy to comparative arms and other hand wound detecting tools to make an intelligent decision on a case by case basis.

Commutator Brushes

1. Commutator brushes shall be manufactured of a copper/carbon compound.
2. Both the top and bottom surfaces shall remain flat.
3. Brushes may be lightly scored to keep from rotating.
4. Replacement brushes must meet ECHORR "On Market" definition requirements.
5. No "dimpling" of the brush tensioners allowed.

Gears

1. The armature pinion, idler gear and driven gear shall be brass.
2. The armature pinion gear shall have 14 teeth.
3. The idler gear shall have 24 teeth.
4. The driven gear shall have 24 teeth.
5. The final pinion shall have 9 teeth.
6. Minimum gear thickness shall be .046".
7. The Crown gear shall have 15 teeth, 4 gear specialty chassis crown gears are not allowed.
8. The Crown gear shall not be metal.
9. The Crown gear shall not be shimmed.
10. **The Crown gear minimum diameter will be no less than .300 inches.**
11. Gears may be lapped and/or polished. They shall not be beveled.
12. Shims between the gears and top plate are not allowed.
13. Plastic top plate gears are not allowed.
14. Hollow cluster shafts are not allowed.

Tires/Wheels/Axles

1. Fronts can be any slip on tire which is stock width or thinner and no smaller than .420". Rears can be any slip on tire which is stock width and no smaller than .460"
2. Truck axle hole will be used for front axle.
3. Tires may be made of silicone.
4. Tire width shall be no wider than .175 (AJ's Width)
5. Tires may be glued to the hubs.
6. Re-coating of tires is not allowed and will be looked at carefully in pre-tech.
7. Only four dimple chrome hubs, yellow wheel truck hub, or after market replacements are allowed; i.e. HO Reproductions, ZoominMotorsports, JW, etc.
8. Double Flange Wheels are allowed.
9. All wheels must be plastic, no metal wheels of any kind.
10. Spacers or springs shall be kept on the outer side of the chassis.
11. Spacers shall be made only of plastic, copper, aluminum, brass, or steel. The diameter of the spacers must not exceed 0.125".
12. No wheel weights of any kind allowed.
13. Axles shall not exceed 1 and 5/16th inch in length. Any axle may be used.
14. All four tires shall simultaneously touch the test track in the static position.
15. Lateral movement of the front tire/axle assembly shall not exceed 1/32" (.03")

Controllers

1. Any type of nonadjustable or adjustable (OHM value only) controller is permitted.
2. Any type of controller is permitted as long as it passes tech.
3. Additional electronics on controllers for changing OHM value is permitted.
4. Additional electronics or hardware on controllers for changing any type of output power to the car such as power to run the car when track power is cut are not permitted.
5. Additional electronics or hardware on controllers for changing any type of brake adjustment are not permitted.
6. Additional electronics or hardware on controllers enabling "coast" or "autopilot" features where power is supplied to the car when the trigger is fully released by the operator are permitted.
7. ECHORR tracks are not wired for brakes, thus only a two-wire hook up is necessary.
8. Any controller or replacement parts must meet the ECHORR defined "On Market" requirements.

Track Power

1. Races shall be run at 20.0 volts +/- 0.25 volts.

No "one of" parts allowed on the cars.

A Final Rule: If anything is not specifically stated or addressed in the above rules it is NOT permitted.

Tour Modified Class

Modifieds are NASCAR's oldest division of racecars. It was established to set up a regional touring format for the popular style of race cars that were the featured attraction at many tracks in the North East. This class is intended to represent the current iteration of this class. This class is based on the BSRT G-Jet®. The BSRT Part Number 915F is a complete car minus body that is legal in this class.

Chassis

1. Cars eligible to compete in this class must be the BSRT G-Jet®.
2. The chassis must be a stock BSRT G3® or G3® R version. The chassis cannot be modified except to add body mounts and the front axle holes may be reamed to .052". Body mounts must be located in the stock locations.
3. The motor magnets must be BSRT G3® Ceramic or BSRT G-Force™ Ceramic-Grade material and cannot be cut. Magnets must remain in their stock position.
4. Armature must be a stock BSRT G-Jet®, narrow gap design, and be a minimum of 9 ohms. BSRT G-Jet® 9 ohm Hot Stock™ armature may be substituted for the stock unit.
5. Armature bushings must be stock or BSRT stock replacement (no ball bearings allowed). Bushings may be reamed, chamfered, and polished.
6. All electrical system parts must be stock or BSRT stock replacement. Helper springs are not allowed.
7. G-Jet® front axle, G-Jet® front wheels (part #877) and G3 front tires (part #950) must be used with a minimum tire diameter of 0.350". The front tire, rim, and axle must be installed using the front, long wheelbase hole.
8. Rear tires must be BSRT G-Jet® slip-on silicone tire part # 880 on part # 879 Double Flange rims with a minimum diameter of .450" on a stock or BSRT stock replacement rear axle.
9. Front and rear rims cannot be drilled or lightened.
10. Gears must be stock or BSRT stock replacement. Gears may not be lightened. Axle spacers and/or gear
11. Spacer may be used to aid with gear mesh.
 - a. Pinion gear must be 7 tooth
 - b. Crown gear must be 21 tooth or 22 tooth.
12. The guide pin must be stock or BSRT stock replacement in the stock position.
13. Glues/adhesives are not allowed on the chassis except to attach the body mounting system and retain the guide pin and weight screw.
14. BSRT G-Jet® marked handling weights must be used. Weights must be used in their stock location. Front weight must be the G-Jet® Indy/Formula 1 specific handling plate (part #887).

Body

1. Body must represent a modern era Tour Modified car
2. Body can be injected molded, vacuum molded, or cast of Lexan, Resin or plastic. No paper/cardboard/cardstock bodies allowed.

Track Power

1. Races shall be run at 12.0 – 14.0 volts +/- 0.25 volts.

Appendix

Appendix A: Magnet Clarification

Pictures and Descriptions of magnets can be found on the Slot car Monsters website:
<http://slotmonsters.com/slot-car-pancake-motor-magnets.ashx>

Magnet Clarification Pictures

Stock Aurora Magnet Bottom:



AFX Magnet Bottom:

