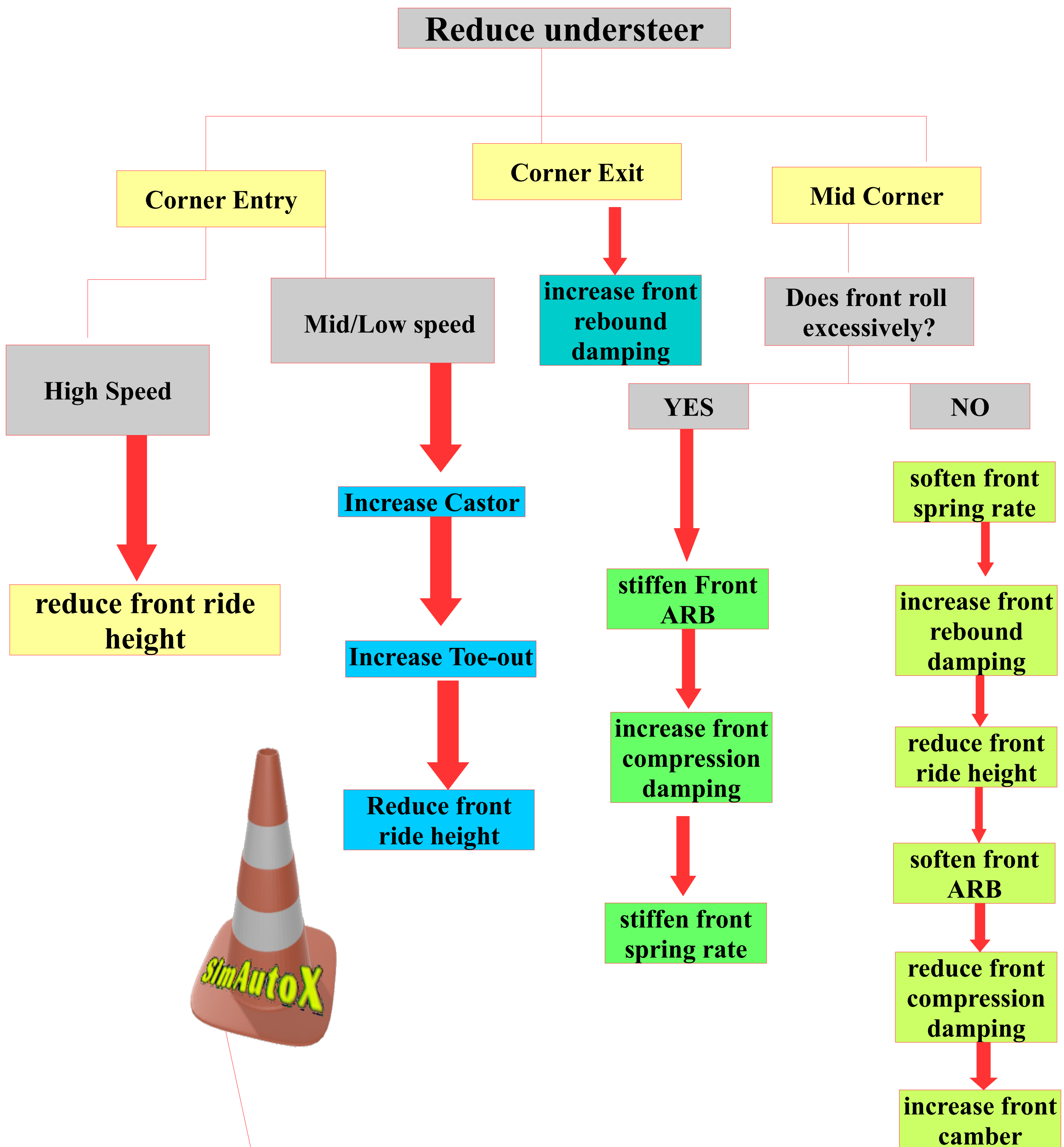


Created by:
Layton Cater

This diagram assumes that tire sizes are fixed and that tire pressures are optimized to produce uniform tread contact and within range temperatures

Reduce Oversteer

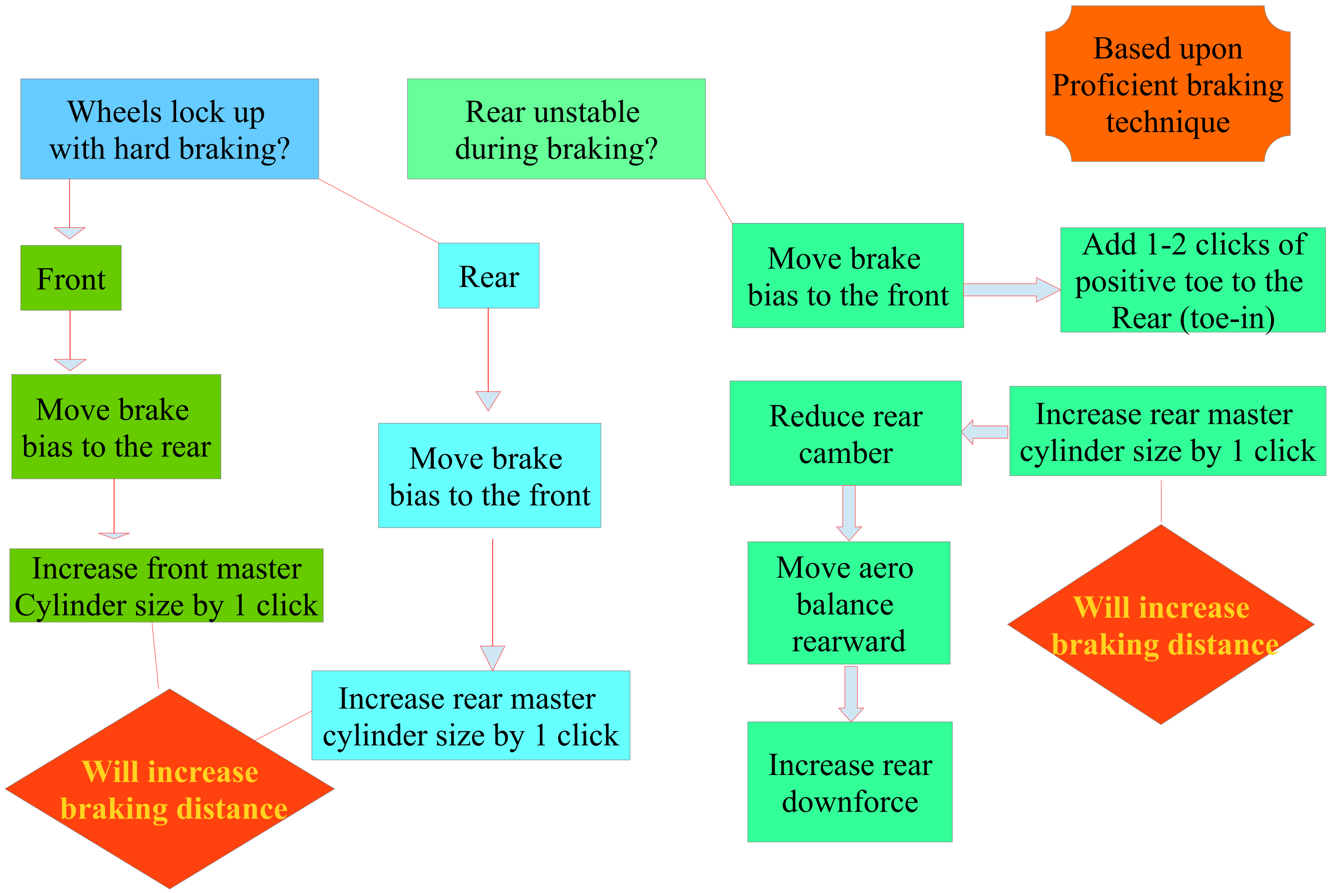
- **Mid-Corner**
  - **High Speed**
    - Increase rear rebound damping
  - **Mid/low speed**
    - **Does rear bottom out?**
      - **no**
        - **Does rear have body roll?**
          - **no**
            - Soften rear spring rate
            - Soften rear ARB
            - Reduce rear ride height
            - Increase rear compression damping
            - Decrease rear rebound damping
            - Increase front camber
          - **yes**
            - increase rear compression damping
            - increase rear ARB stiffness
            - increase rear spring rate
      - **yes**
        - increase rear spring rate
- **Exit**
  - reduce rear ride height

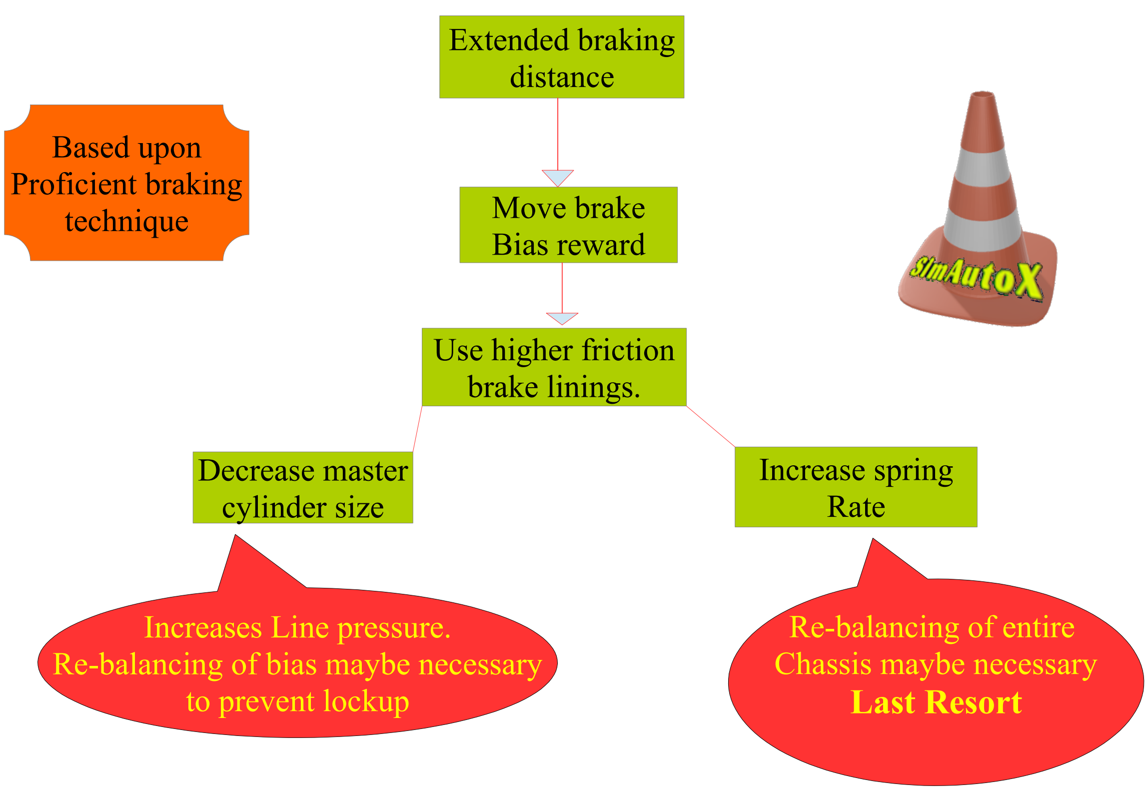
This diagram assumes that tire sizes are fixed and that tire pressures are optimized to produce uniform tread contact and within range temperatures

Cornering Phase	Corner and damper travel direction	more understeer	More Oversteer
Entry: Phase 1 More braking and steering	Outside Front Bump Inside Front rebound	More F Bump ________________ Less R rebound	Less F Bump ________________ More R rebound
Entry: phase 2 less braking and more steering	Inside Front rebound Outside rear bump	More F rebound ________________ Less rear bump	Less F rebound ________________ more rear bump
Entry: Phase 3 more steering at constant throttle	Outside front & outside rear bump Inside Front & inside rear rebound	More F bump More F rebound less R Bump less R Rebound	Less F bump Less F rebound More R Bump More R Rebound
Exit: Phase 4 less steering at constant throttle	Outside front and outside rear Rebound Inside front & inside rear rebound	Less F bump Less F rebound More R rebound More R bump	More F bump More F rebound Less R rebound Less R bump
Exit: Phase 4B less steering and more throttle	outside front rebound Inside rear bump	Less F rebound ________________ More R bump	More F rebound ________________ Less R bump

Created by: SimAutox

Braking and Brake Stability





Toe and effect

Front Toe Out

Just Right	Too Much
Helps reduce understeer on turn-in	Makes car twitchy under braking
Makes car more responsive to steering input	Unstable in a straight line, especially over single-wheel bumps or split traction surfaces
Helps FWD and AWD cars counter their natural tendency to toe-in under throttle load.	An extreme amount of front toe-out will cause the car to refuse to turn and go into unrecoverable understeer
	Car will be very crown sensitive and tend to follow the contour of the road strongly.

Front Toe In

Just Right	Too Much
Generally helps make the car feel more stable. Usually done in small amounts on RWD and rear engine cars.	Wandering under braking
You would probably do this on your mom's car or a car that you mostly care about driving on the street for normal use.	The car will refuse to turn in or turn in very quickly and immediately go to understeer, feels sluggish to steering input.

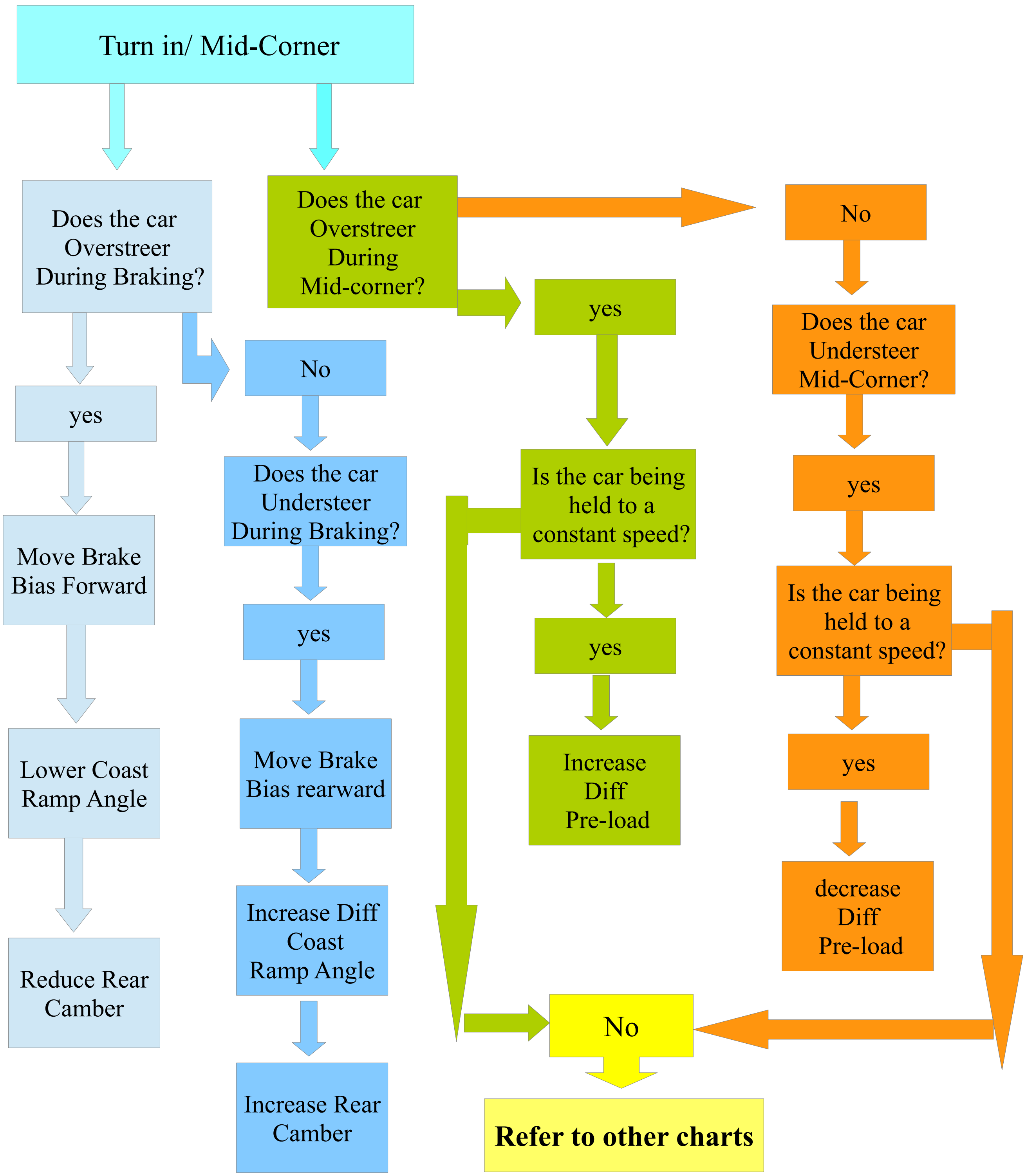
Rear toe out

Just Right	Too Much
Helps the car rotate in mid turn and get away from overloading the front tires with understeer. Generally this is a FWD only trick usually for stock autocross classes or rally.	Causes sudden onset of oversteer on throttle in RWD applications. Causes violent oversteer all the time on anything other than a FWD car. Car feels unstable.
Generally you would not ever want to do this unless you had no other tuning option.	Makes a car rotate violently when the throttle is lifted or when the car is trail braked into a turn. Generally not good.

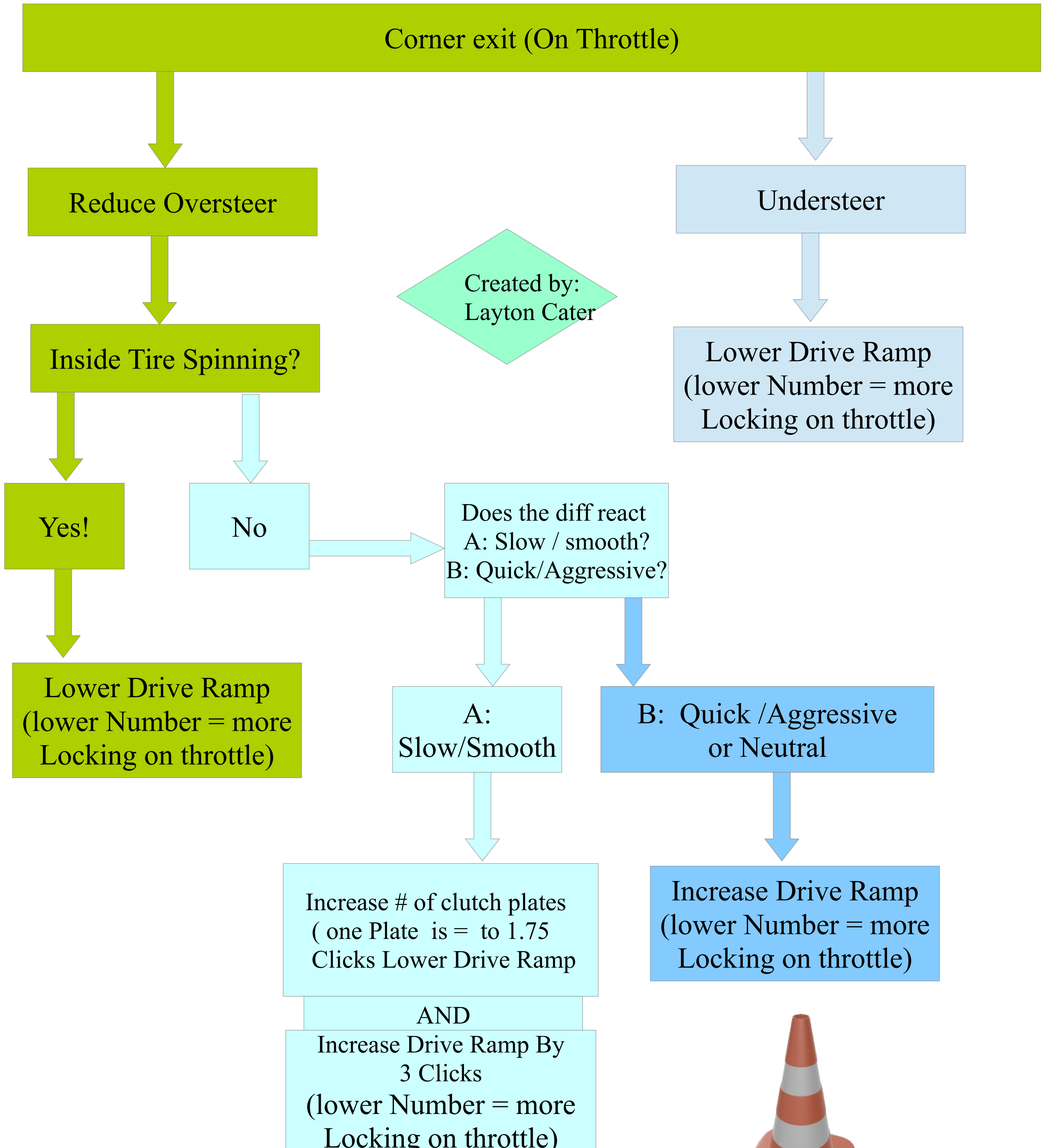
Rear Toe In

Just Right	Too Much
Helps a RWD car get on the throttle sooner and harder, making power oversteer feel more natural and manageable.	Makes a car sluggish in response and creates a tendency to understeer in mid turn and sometimes on exit.
Helps a driver of a drift car stand on the gas and sometimes get more forward bite under drift.	Gives a car a weird rocking wandering feeling on turn in. It feels very strange, unstable and awkward.
Less or zero toe can help an underpowered drift car maintain angle at high speed when the engine doesn't have enough power to maintain wheel speed.	Makes a drift car twitchy under drift and want to grab traction and straighten out suddenly. Extreme toe in can cause initial understeer with a sudden transition to oversteer.
Can reduce or eliminate over rotation under trailing throttle or trail braking.	SimAutox.com

Differential and Braking Tuning; Initial Phase



Differential Tuning Corner Exit



Higher Drive Ramp Angle	**lower locking on throttle application**	**More understeer**
Higher Drive Ramp Angle	**lower locking on throttle application**	**allows the car to turn more readily when under the limit of the tire adhesion**
Higher Drive Ramp Angle	**allows the inside wheel to spin**	**slow speed corners: loss of traction and poor acceleration out of the corner. high speed corners it can result in understeer on mid corner and corner exit with throttle application.**
Lower Drive Ramp Angle	**more locking on throttle application**	**resists the car turning when under the limit of the tires adhesion (More understeer)**
Lower Drive Ramp Angle	**more locking on throttle application**	**approaching the limit of tire adhesion allows the driver to “turn the car with the throttle"**
Lower Drive Ramp Angle	**more locking on throttle application**	**too low Ramp angle can result in rapid throttle oversteer.**
Lower Drive Ramp Angle	**more locking on throttle application**	**Lower drive ramp gives better acceleration and enables the car to turn on medium to high speed corners easier without having to lift off the throttle.**

Example: **If the car is understeering in mid corner or exits of high speed corners or the inside wheel is spinning under acceleration. Reduce the ramp angle a click, if the car is entering throttle on oversteer to easily increase the ramp angle a click.**

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Drive Ramp Angle: used to tune the amount of locking under deceleration/acceleration

Higher coast ramp angle	**lower locking power under deceleration**	**Allows the car to turn more readily when under the limit of the tire adhesion**
Higher coast ramp angle	**lower locking power under deceleration**	**Taken to high allows a single rear wheel lock up which can equal instability in the braking zone often ending in a spin**
Lower coast ramp angle	**more locking under deceleration**	**resists the car turning into a corner when under the limit of the tires adhesion (More (understeer)**
Lower coast ramp angle	**more locking under deceleration**	**Increases braking stability but if pushed too low, can cause both rear tires to lose traction**

Example: if the car tends to lock up under braking, reduce the angle a click or two. Alternatively adjust brake bias forward. If the cars braking can be improved increase the angle a click at a time.

Adding Clutch Plates	**increases the locking factor by about the equivalent of 1.5 to 2 clicks lower in ramp angle**	**50 with 3 plates is approximately the same as 40-45 with two plates**
Adding Clutch Plates	**Slower and more smooth Diff activation**	**Helps smooth out Application of throttle and lift off**
Adding Clutch Plates	**more locking happens through all corner phases.**	**Balance of the cars DECEL/ACCEL behavior**
Removing Clutch Plates	**Decreases the locking factor by about the equivalent of 1.5 to 2 clicks higher in ramp angle**	**40 with 2 plates is approximately the same as 50-55 with three plates**
Removing Clutch Plates	**Faster and more aggressive Diff activation**	**Improves lock and unlock times for tighter tracks and transitional elements such as chicanes and hairpins**
Removing Clutch Plates	**Less locking happens through all corner phases**	**Balance of the cars DECEL/ACCEL behavior**

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SimAutoX

Example: Add clutch plates to smooth out the differential (Track with lots of sweeping turns with low throttle input) Remove clutch plates for faster Diff response and better turning.

Preload spring: defines the base amount of force that is applied on the clutch plates at all times . With small enough (or negative) preload, you can open up your differential. The heavier the preload spring, the easier your differential will lock.

Higher Preload	**more locking when the car is neutral state or between the phases of ACCEL/DECEL**
Lower Preload	**Less locking when the car is neutral state or between the phases of ACCEL/DECEL**

Example: If the car is too loose mid corner raise the preload, if it is too tight reduce the preload. This judgement is taken when the tire noise is telling you that the tires are scrubbing. if you're not judging it in that mode then you will be adjusting it incorrectly.

Keep this setting low as possible.

Most clutch-type LSDs will have some amount of initial preload. This is the amount of torque that will always be locking the two wheels together. Increasing the preload increases the responsiveness of the locking effect. Increasing the preload too much makes the vehicle extremely hard to turn. High preload settings are more susceptible to chatter too. Preload simply represents the "base" or static amount of locking torque dialed into the system. Some clutch-type LSDs will actually set this number near zero to give an open-differential friendliness at low speeds and to limit noise and other issues. In these cases, all of the locking action becomes the responsibility of the cam angle and the clutch setup.