

Chapter 13 CONTROLLING Longitudinal & Lateral WEIGHT TRANSFER



FIG. 13.1 Lateral Weight Transfers important in All Vehicles especially *Dune Buggies* and *ATVs*
(custom Buggy & ATV by Peak Performance. La Pine. OR)

Tuning of suspensions requires knowing how the components load and unload as the vehicle “does its thing”. Sources of loading were considered in Chapter 10. The *basic* vehicle in Chapter 11 considered Longitudinal weight transfer. This last chapter considers safe handling via rolling motions, and modifying longitudinal and Lateral (side-ways) weight transfers. Comprehension requires five technical laps: 1. *Summary of Vehicle Loading*, 2. *Rolling Moments (around the X-axis) & Definitions*, 3. *Torsional Stiffness*, 4. *Connectors & Instantaneous Centers*, and 5. *Installation Ratios & Other Changes*. Most racers will find the review in the first tech-lap useful. All racers will find critical definitions in the second tech-lap. Some racers will find that the third tech-lap clears up some misconceptions on frame stiffness and rolling behavior. The last two tech-laps are interrelated since the location of connectors and housings determine both the *Instantaneous Centers* and the *Installation Ratios*. *Instantaneous Centers* define the Front and Rear *Moment Centers*. Bob Bolles[†] said in 2005 that “*the design of the location of the moment center is critical to how your front end will work and is a critical ingredient in determining the overall balance of the setup in your car*”. This summarizes the importance of the last two tech-laps.

[†] Senior Tech Editor, *Circle Track* Magazine.

Section Details

1. **Summary of Vehicle Loading.**
2. **Rolling Moments (around the X-axis) & Definitions:**
Instantaneous Axis & Center, Rates versus Compliance.
3. **Torsional Stiffness:**
Rigidity Models, Moment Arm & Rolling Moments, Rigid Chassis Roll-Angle, Parallel vs. Series Springs, Non rigid Frame/Chassis, Determining Torsional Stiffness Ratios, and Balancing Vehicles in Torsion.
4. **Connectors & Instantaneous Centers:**

Concept of IC, Front View IC, Jacking, Tire Scrub, Camber Changes, Side View IC & “Anti-Features”, Moment Centers, Chassis Rotation due to Engine Torque, and Track Bar.

5. Installation Ratios & Other Changes:

Concept of Installation-Ratio (Motion-Factor), Displacement vs. Rolling Angle , “Centerline” vs. Transverse Changes, Pivoting Suspensions, Rolling Resistance for A-arms, Suspension Devices on a “Rigid” Axle, 3D Influences.

Total number of safety ideas = 36

Total number of safety principles = 48

Total number of illustrations = 58

Total number of examples = 30