Northern Arizona University
Baja SAE 2014

Owner's Manual

Contents

Vehicle Overview

The 2014 Baja SAE is a single-seat vehicle intended for off-road use only. It is rear wheel drive with a single cylinder 305 cc engine mounted in the rear. The drivetrain is comprised of a continuously variable transmission connected to a limited slip differential. The driver is seated in the center of the vehicle just in front of the engine. Fully independent suspension is used for all four wheels, with double-wishbone in the front and three-link in the rear. This vehicle is at home on the roughest terrain and was designed with simplicity and ease of use in mind.

Safety Equipment

Never operate this vehicle without the proper safety restraints. They are included to reduce the risk of injury inherent in off-road racing. The driver should understand the proper use of the safety restraint systems and ensure they are functioning correctly before operating the vehicle. In addition to the safety equipment permanently attached to the vehicle, it is heavily recommended that the driver wear a helmet, neck brace, gloves, and arm restraints. Northern Arizona University cannot be held responsible for injuries sustained during the operation of this vehicle.

Seat

The seat in the vehicle is non-adjustable and is mounted in the center of the roll cage. The standard seat can be removed by removing the bolts that secure it to the frame. Other seats that have a compatible mounting system can be substituted, but care must be taken to ensure compatibility with the 5-point safety harness.

Safety Harness

This vehicle is equipped with a 5-point safety harness. The shoulder and lap belts are adjustable in length for different size drivers. The anti-submarine belt is non-adjustable. To properly fasten the harness:

1. Loosen the shoulder and lap belts.
2. Insert the left lap belt buckle through the left shoulder belt, the anti-submarine belt, the right shoulder belt, and the right lap belt, respectively.
3. Fasten the latch attached to the right lap belt.
4. Tighten the shoulder and lap belts.

If any part of the harness becomes damaged or begins to fray, discontinue use immediately and have a new harness installed by a qualified professional.

Emergency Stop

Two emergency stop switches are on the vehicle. On is easily reachable in the cockpit by the driver's left hand. The other is mounted on the outside of the vehicle in the event the driver becomes incapacitated or the vehicle is unoccupied. The emergency stop switch will immediately cut the ignition and stop the engine. The electrical systems continue to be powered when the emergency stop is used.

Fire Extinguisher

In the event of a fire, a fire extinguisher is mounted to the firewall directly to the right of the driver. In case the driver is incapacitated or the vehicle is empty, the fire extinguisher is also accessible from outside the vehicle. To use the fire extinguisher, remove the safety pin and squeeze the handle while pointing the fire extinguisher at the base of the fire.

Vehicle Operation

Steering

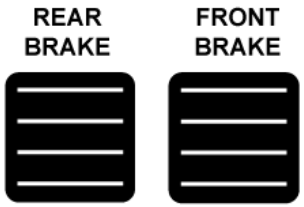
The steering is controlled by the steering wheel located directly in front of the driver. The wheel moves half a turn from lock to lock for quick responsive steering. The wheel itself can be removed with the quick release mechanism attached to the back of the wheel.

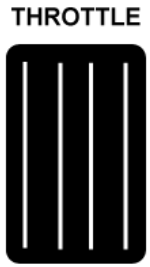
Throttle

The throttle is controlled with a pedal located under the driver's right foot. Depress the pedal to increase the throttle opening and make the vehicle accelerate.

Brakes

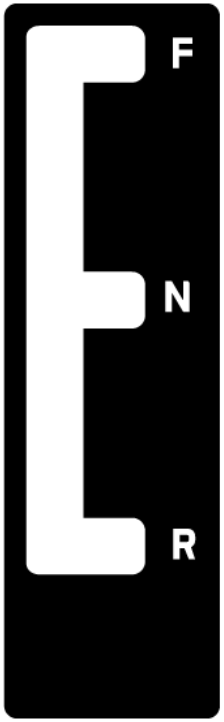
The brakes are controlled with two pedals located under the driver's left foot. The left pedal applies the brakes on the rear wheels, and the right pedal applies the brakes to the front wheels. Both pedals can be simultaneously depressed with a single foot to apply the brakes to all four wheels. The brake light located on the rear of the vehicle will illuminate when either brake pedal is depressed.





Gear Selector

The gear selector lever is located on the floor of the vehicle to the right of the driver. There are three positions: forward, neutral and reverse. Moving the lever to the forward position selects forward gear. Moving the lever to the rearward position selects reverse gear. While in reverse, a warning alarm will sound and the reverse indicator light on the rear of the vehicle will illuminate. The center position is the neutral position and disengages the gearbox. While in neutral, the neutral indicator light on the dashboard will illuminate.



Starting the Engine

Ensure the vehicle is in neutral before starting the engine. To start the engine:

1. Move the fuel cutoff switch to the on position.
2. Move the choke lever to the choke position.
3. Pull the pull-start cord repeatedly until the engine is running.
4. Move the choke lever to the run position.

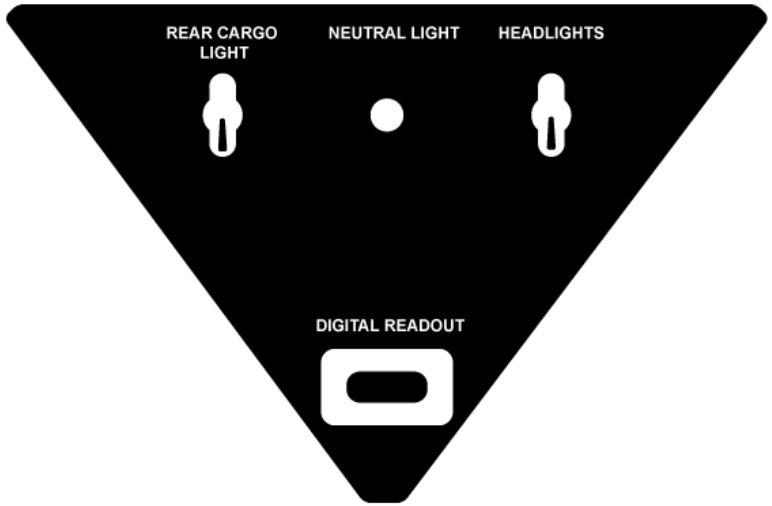
Lights

This vehicle comes equipped with running lights and a large LED headlight array for nighttime operation. The headlights and the running lights are controlled from a single toggle switch mounted on the right side of the dashboard.

The reverse indicator light can be manually turned on to illuminate the engine and drivetrain assembly for ease of starting the engine in the dark. The toggle switch mounted on the left side of the dashboard controls the manual operation of the reverse indicator light.

Digital Readout

The multi-function display mounted to the dashboard displays the engine revolutions per minute when the engine is running. When the engine is off, the display shows the total runtime of the engine in hours.



Maintenance

Some components on this vehicle are wear-parts that need to be replaced at regular intervals. Failure to follow the recommended service intervals could result in serious damage to the vehicle.

Engine

First 5 Hours
• Change oil
Every 8 Hours or Daily
• Check engine oil level • Clean area around muffler and controls • Clean finger guard
Every 25 Hours or Annually
• Clean air filter • Clean pre-cleaner
Every 50 Hours or Annually
• Change engine oil • Check muffler and spark arrester
Annually
• Replace air filter • Replace pre-cleaner • Replace spark plug • Replace fuel filter • Clean air cooling system • Check valve clearance

Transaxle and Differential

The transaxle and differential oil should be changed annually. Limited-slip additive is also necessary, see the specifications chart for proper fluids.

Continuously Variable Transmission

The CVT belt should be changed every 50 hours of operation or annually. A good practice is the change the CVT belt and inspect the CVT pulleys with every engine oil change.

Adjustable Components

Some elements of the suspension and steering of this vehicle are adjustable. While it is possible to make adjustments, it is recommended that only a qualified technician do so. Failure to properly adjust the steering and suspension elements could make the vehicle unstable and unsafe to operate. The user assumes all risk associated with making adjustments to vital suspension and steering components.

Front Wheel Toe

The toe angle of the front wheels is adjustable by changing the length of the tie-rods. Before adjusting the toe angle, ensure that the front wheels are suspended above the ground and the vehicle is properly supported. Loosen the jamb nuts on the rod-end bearings on either end of the tie rod. Then twist the tie rod to adjust the toe angle. After reaching the desired length, tighten the jamb nuts to secure the tie-rod. Lengthening the tie rod increases the toe angle, shortening the tie rod decreases the toe angle.

Front Wheel Camber

The camber angle of the front wheels is adjustable by changing the length of the upper and lower A-arms. Before adjusting the camber angle, ensure that the front wheels are suspended above the ground and the vehicle is properly supported. Also ensure that the front spring and damper assembly has been removed.

Remove the nuts securing the upper and lower A-arm to the spindle. Remove the double rod-end bearings from the spindle, then screw them in or out to the desired position. Reattach the spindle and secure it with the two nuts. Increasing the length of the upper A-arm relative to the lower A-arm will increase the camber angle. Decreasing the length of the upper A-arm relative to the lower A-arm will decrease the camber angle.

Alternatively, remove the four bolts securing the upper and lower A-arms to the frame. Then thread the four rod-end bearings in or out to adjust A-arm length.

Rear Wheel Toe

The toe angle of the rear wheels is adjustable by changing the length of the two parallel rear links. Before adjusting the toe angle, ensure the rear wheels are suspended above the ground and the vehicle is properly supported. First, loosen the jamb nuts on all four link ends. Remove the bolt securing the upper end of the link to the frame. Adjust the length of the links by screwing the rod-end bearings in or out. Care must be taken to adjust both links by the same amount to avoid unintentionally changing the rear camber angle.

Rear Wheel Camber

The camber angle of the rear wheels is adjustable by changing the length of the two parallel rear links. Before adjusting the camber angle, ensure the rear wheels are suspended above the ground and the vehicle is properly supported. First, loosen the jamb nuts on all four link ends. Remove the bolt securing the upper end of the link to the frame. Adjust the length of the links by screwing the rod-end bearings in or out. Instead of adjusting the links by the same amount, adjust the link length by different amounts to change the camber angle. Increasing the length of the upper link relative to the lower link increases the camber angle. Decreasing the length of the upper link relative to the lower link decreases the camber angle.

Specifications

Fluids		
Engine Oil (All Temperatures)	Synthetic 5W-30	20 oz
Transaxle/Differential Oil	JD J20C or equivalent	28 oz
Limited Slip Additive	Amsoil Slip-Lock	2 oz
Brake Fluid	DOT 4	Keep between MAX/MIN
Fuel	Minimum 87 Octane	
Engine		
Model		200000
Displacement		305 cc
Bore		79.24 mm
Stroke		61.93 mm
CVT		
Belt	CVTech KE52	242 mm
Tires		
Wheel	Vision 159 Outback	12 x 7
Tire	Carlyle AT489	23-8 x 12