

Anomaly SV2

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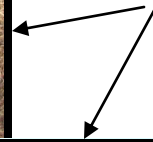
The following describes the various unique designs that act together to be the Anomaly SV2 motorcycle. Anomaly as defined is, "Deviation or departure from the normal or common order, form or rule", and "One that is peculiar, irregular, abnormal, or difficult to classify". Shop Version 2 (SV2) signifies that this is the second version of the Anomaly motorcycle. Field testing of this prototype has shown it to be solid with much future potential.

By: Jeff Harp





These pictures are from the prototype check-out stage.



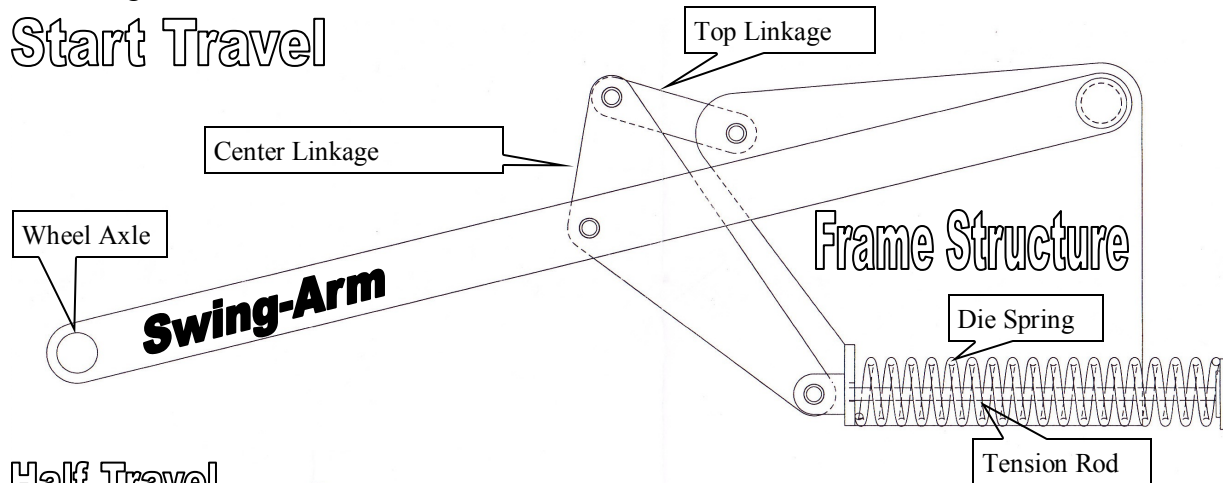
The Anomaly SV2 finished



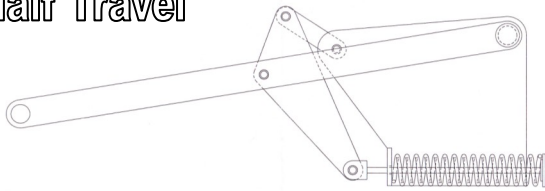
Suspension-

The Anomaly SV2 utilizes an undercarriage located Straight Pull Suspension System (SPS). The SPS system is designed to take the rotational swing-arm movement and translate it into linear movement. This allows the use of a tension rod acting through the center axis of a spring to provide suspension for the wheel. Otherwise stated, the SPS system accomplishes a near straight pulling action through the use of linkages that counteract the arcing movement of the swing-arm.

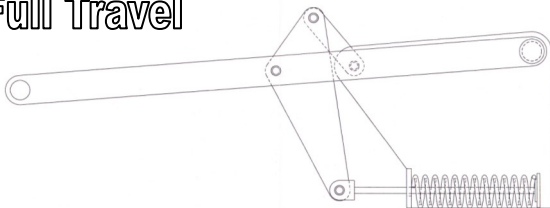
Start Travel



Half Travel



Full Travel



Notice that the top linkage and swing-arm pivot are attached to the frame structure. As the swing-arm is rotated (wheel moves up relative to the frame structure) the top linkage holds-in-place the upper pivot of the center linkage. Also notice how the tension rod end of the center linkage counters the swing-arm arc with a linear motion. With optimized length ratio's of the linkages, the linear motion can be designed to have very little straight-pull deviation.

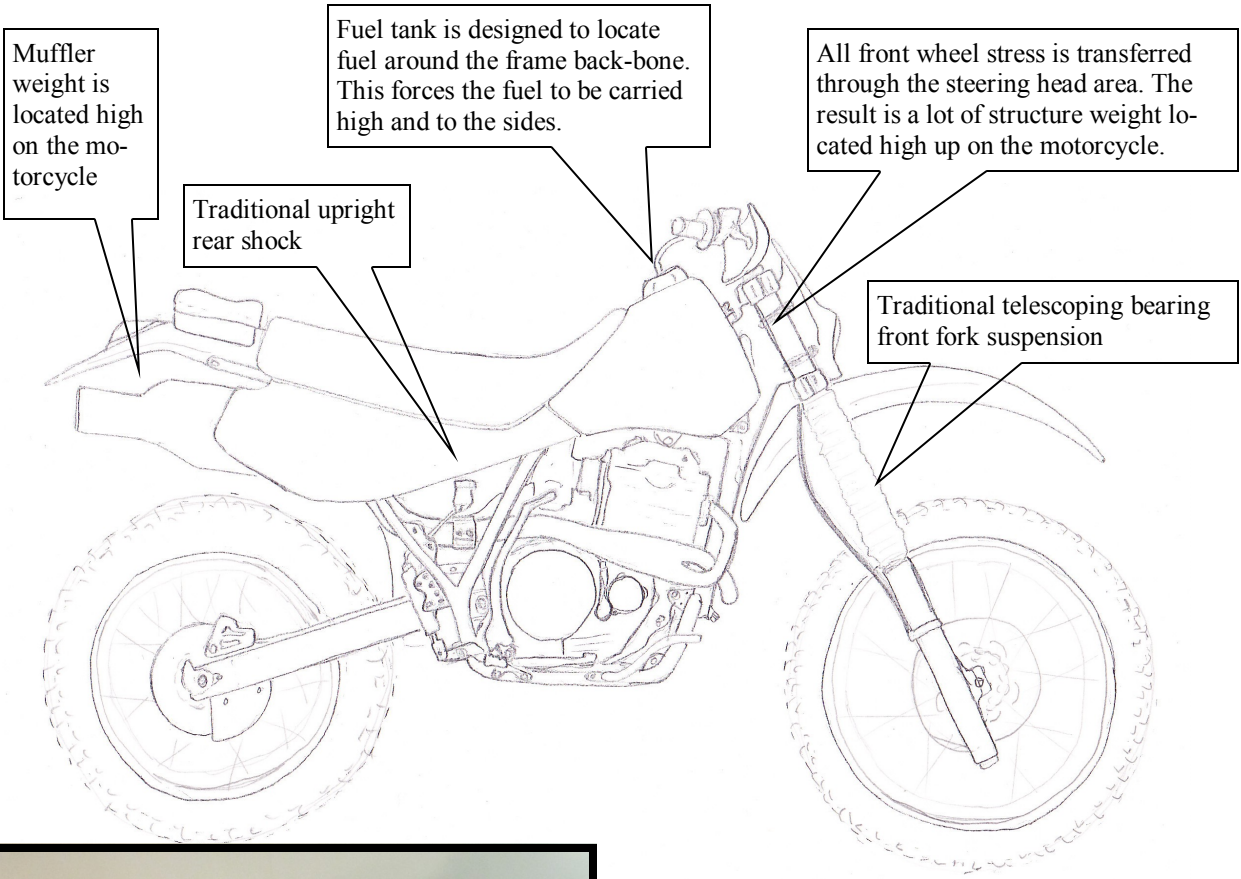
On the Anomaly SV2 the SPS system (front and rear) are designed to provide progressive movement on the spring. This means that the wheel movement to spring compression ratio changes as the wheel moves through its travel. This progressive movement provides a greater suspension bottoming resistance with expediential pressure applied to the spring. The Anomaly SV2 also uses two die springs for the front and two for the rear. They are housed inside the box frame located under the engine.

The benefits of the SPS system are as follows; To re-locate weight that is normally located high on the standard configuration motorcycle (lowers the center of gravity), allows for the use of more efficient (work to weight ratio) die springs or urethane springs (urethane for weight reduction and self dampening properties), reduction of the required structure length from front to rear wheel thereby reducing structure weight, providing room above the engine to allow for more optimizations of fuel tank capacity and center of gravity (also freedom for radiator and air-box locations), and finally there is the benefit of a design that has unrealized potential unlike current designs that have been being refined for decades.

The Anomaly SV2 is intended to make several improvements to today's motorcycles. These improvements are as follows; substantially lowered center of gravity with entire suspension system and frame structure located below the engine providing stability and maneuverability, improved suspension movement with pivot bearings verses telescoping fork bearings, lighter suspension components with tension rod system resulting in over all lighter machine, and more flexibility with fuel tank weight center of gravity due to removed upper suspension components. Additionally, the Anomaly SV2 does have a shorter wheelbase than other comparable traditional design motorcycles. Low center of gravity and movement arc of the front wheel ensures that stability gains are not compromised and handling is further improved!



The SPS system could be adapted to many applications. Nearly all vehicle wheel suspension types could be re-worked to use the SPS system. Because the SPS system transfer's all the stress through a small, concentrated area in the frame, reductions in overall machine structure for any suspended machine could be a potential benefit. In addition, the structure as well as suspension weight is carried very low keeping the center of gravity at the very bottom. For these reasons the SPS system has great potential value. Weather the SPS system is used on an ATV, UTV, automobile or motorcycle a lower center of gravity equals a better handling and more stable machine!



Steering and Front Geometry-

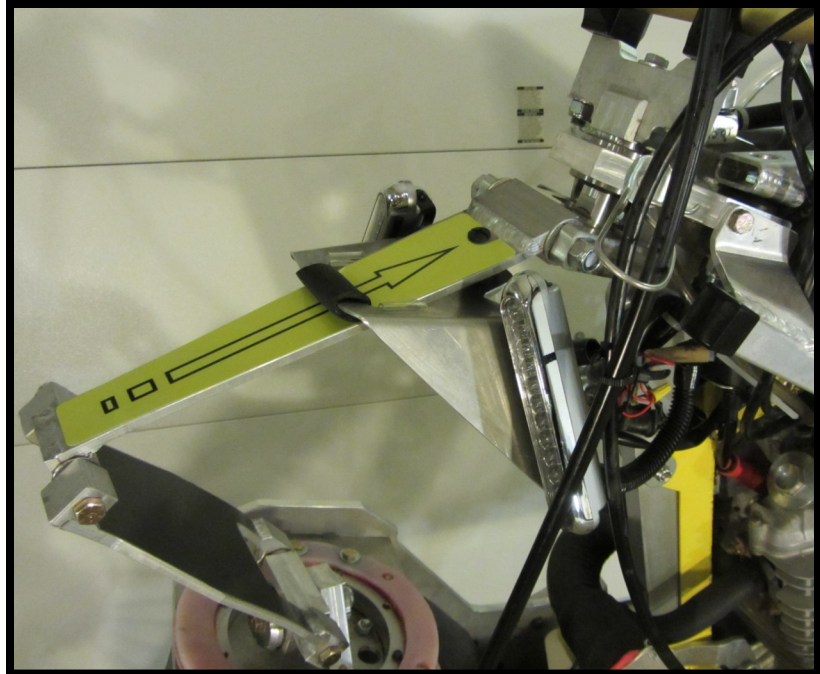
The Anomaly SV2 utilizes a Wheel Top Steering (WTS) system. The WTS system is based around a large diameter thin section cross-load bearing. An angled swing-arm uses this thin bearing on the wheel side to attaché the front wheel to the SPS system on the frame side. Effectively providing suspension travel and steering to the front wheel. The inside race of the thin bearing is fixed to a type of front wheel fork structure. This fork structure contains the wheel and disc brake components but has no suspension features. The bearing center line angle (relative to the ground) provide the motorcycle with handling stability. The center line angle is comparable to, “rake and trail” calculated in a standard traditional fork suspended motorcycles with the difference being that the, “rake and trail” number increases as the suspension is compressed. The Anomaly SV2 uses a very standard rake and trail (approx. 3.6”) with the standard riders weight on the suspension. However, as additional suspension travel is used the rake and trail number increases. This means that as more downward force is applied to the suspension the motorcycle has an increasingly greater tendency to track straight. This straightening tendency under greater load is considered a benefit of the WTS system.

Steering for the WTS system is accomplished by transmitting steering input through the traditional handlebar to the wheel fork assembly. The handlebar pivots on bearings mounted where the steering head would be on traditional motorcycles. This pivoting handlebar anchor point is set to replicate the standard steering head angle feel (ergonomics). Future designs could vary this angle to set the ergonomics at what is optional for the rider. The linkages that transfer the steering input from the handlebar to the wheel fork structure are basically two universal joints combined with a hinge type joint. The Anomaly SV2 uses a universal joint top and bottom with a hinge joint in the middle. However, a universal joint could have been used on the bottom and middle joints with a hinge joint at the top. The steering linkages provide free up and down motion with rigid side to side steering input transfer.

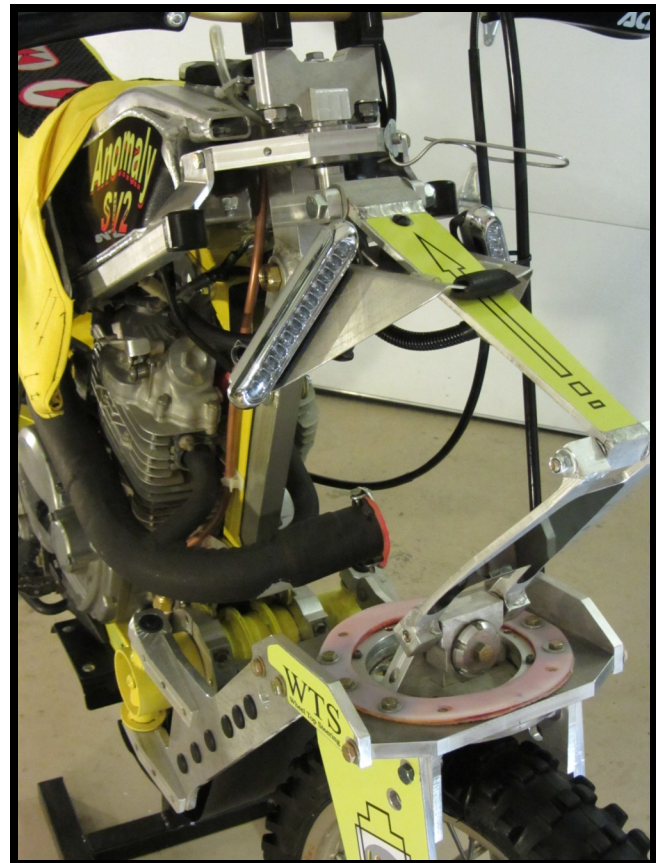
Large diameter small cross section high capacity bearing clamped inside.



Note: These steering linkages can work with any combination of two u-joints and one hinge joint. For example, the top and bottom could be universal joints with the middle joint being a hinge type joint or the bottom and middle joints could be universal joints with the top a hinge type joint. A spherical ball joint could even be used for the middle joint.

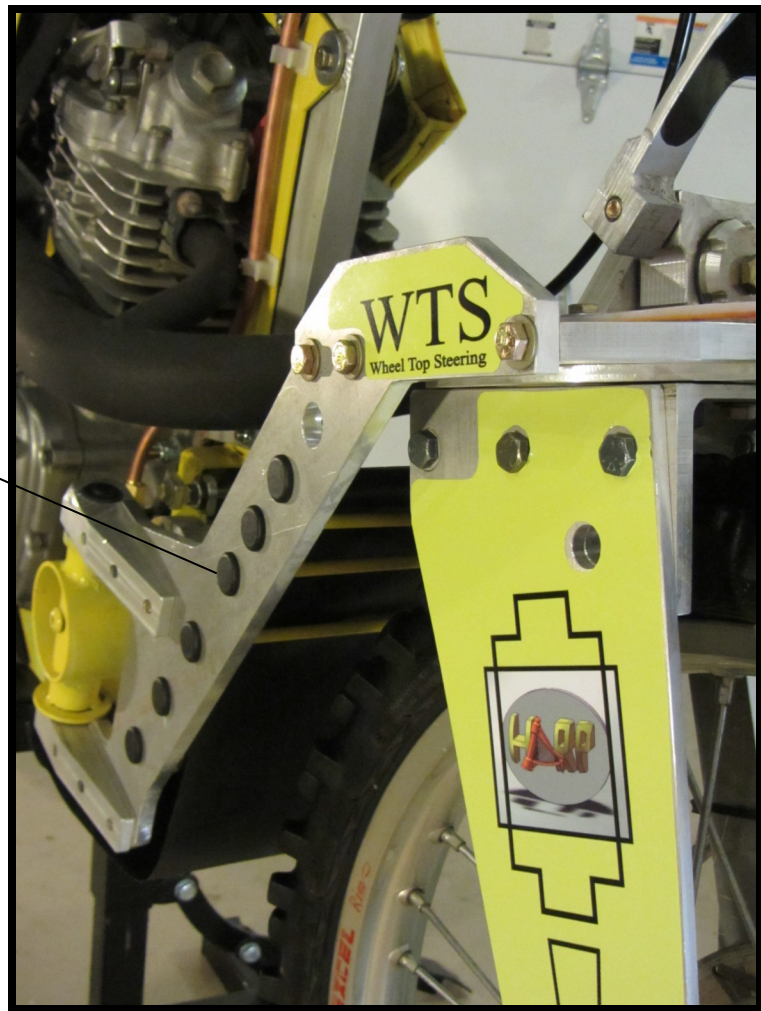


The WTS system is also used for additional purposes. Aside from being somewhat of a fender. The upper linkage serves as an optimal head light mounting location, with the geometry like or similar to the Anomaly SV2, the head light mounted on the upper linkage remains pointing forward through the race sag (rider on) to the fully compressed suspension position. However, when the load reduces, such as in a wheelie or jump, the headlight points more downward. This is a design benefit as the light is pointed where the rider needs to see. Additionally, the upper linkage has less up and down movement than the handlebar which minimizes up and down movement of the headlight on rough trails when compared to a standard forked motorcycle. Finally, just like the standard forked motorcycles, when the handle bar is steered side to side the headlight follows the direction of steer.



The fender for the WTS system front wheel consists of the lower steering linkage for the top and a series of fiberglass rods holding a mud flap for the lower section. The fiberglass rods span the holes in the left and right angled swing-arm. The rods are retained with plastic hole caps over each end. The flap is held in place on top with a loop around the upper most fiberglass rod and two fasteners at the bottom. The mud flap is distanced from the wheel and suspension components by the series of fiberglass rods. The flap is made of a coated fabric. This flap material has the advantage of movement to remove mud debris where as the traditional solid plastic doesn't flex as much so it holds mud. This overall fender arrangement on the WTS configuration allows more air flow to cool the motor at the top portion and gives way better bike protection from debris at the bottom.

Plastic tube cap retains fiberglass rod shown (yellow). The fiberglass rods hold the position of the plastic coated fabric mud flap (fender). The flexibility of the mud flap helps to dislodge accumulation of debris.



The Anomaly SV2 has tie down locations that do not compress the suspension. By attaching the tie downs to the wheel fork structure of the WTS system the bike can be restrained with little effect on the suspension. This is an advantage in that there is no concern with sagging the suspension springs with lengthy tie down occasions. For current fork designs, an after market spacer can be bought to effectively block the suspension while bike is tied down. Needless to say, this is not required for the Anomaly SV2!



LED headlights

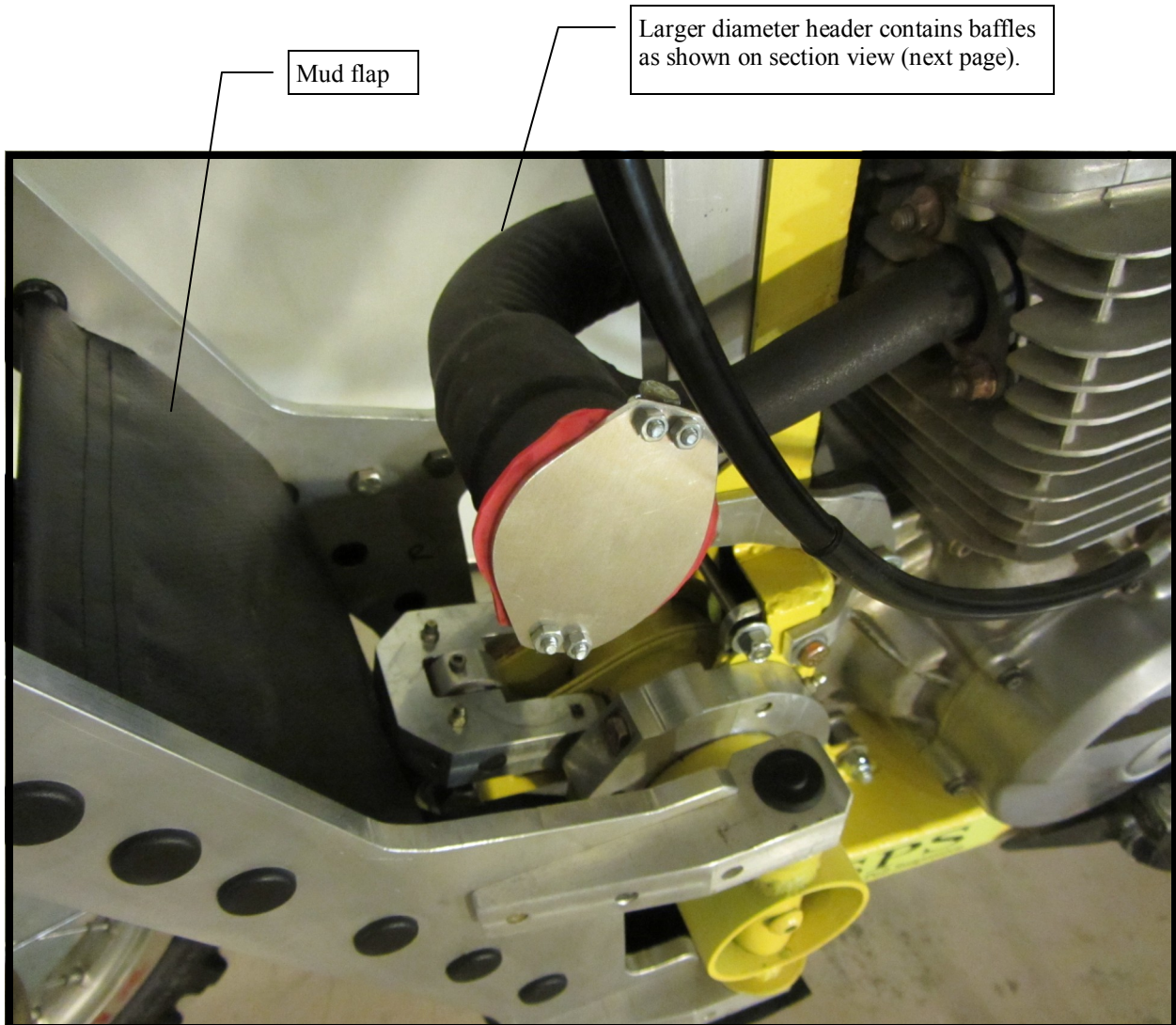
Add-in eye hook shown but may not be required for different strap hook sizes



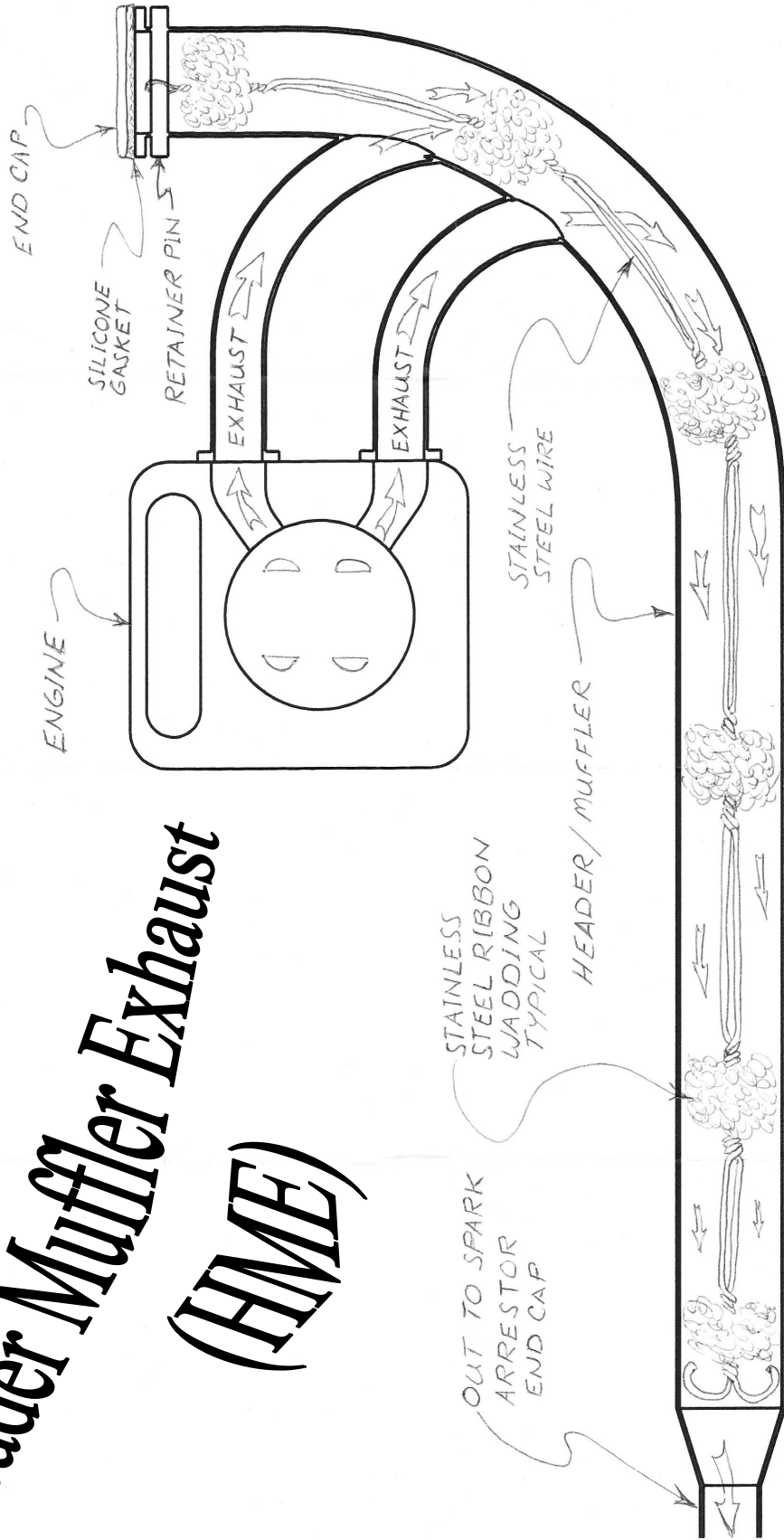
Motorcycle tie down

Exhaust System-

The Anomaly SV2 doesn't only use suspension to lower the center of gravity. The Anomaly has a Header Muffler Exhaust system (HME). So, just as stated in the name, the traditional header portion of the exhaust system is where the exhaust/engine noise reduction dampening is located. By using this exhaust system, weight that is usually located toward the top of a motorcycle (muffler location) is moved down and centralized near the engine (header location). The HME works by using a larger diameter tube header that has stainless steel ribbon type wadding pads that are spaced at intervals apart. To prevent the wadding material from compacting together, the pads are retained and spaced using stainless steel wire that is held in tension with it's connection occurring prior to any exhaust inputs. To explain, there is a cap on the large tube on the header input end. This cap is located ahead of the first engine exhaust input. From the cap side the wire is looped over a fastener thus keeping the entire line of stainless steel baffles and wire in their proper locations. To quiet the exhaust simply add more baffles in the line. Due to ease of maintenance, adjustment, durability and more lowered and centralized weight distribution, the HME system is superior for many applications.

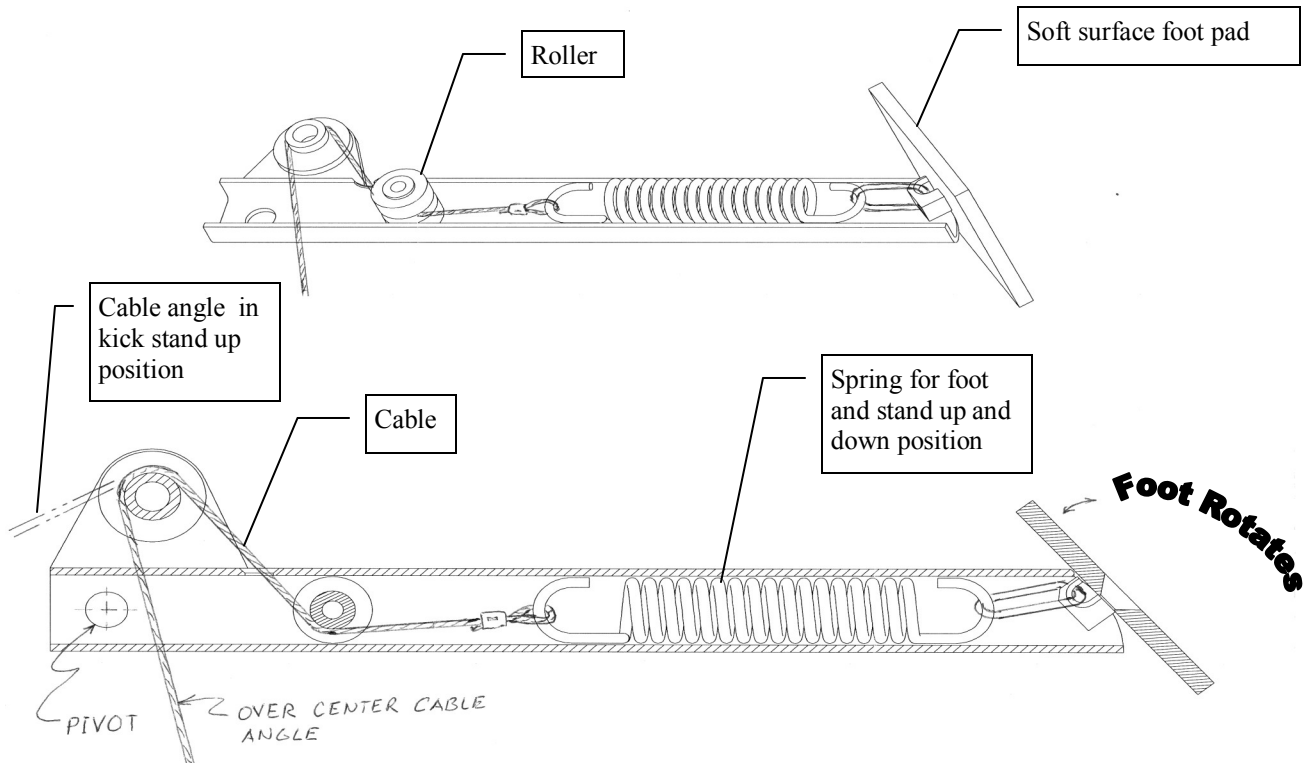


Header Muffler Exhaust (HME)



Kick Stand-

The design of the Anomaly SV2 also included a solution to a long lived problem on standard dirt bikes which is kick stand failure (bike tips over). What happens is that the kick stand is put down and the soil, sand, grass, etc is too soft resulting in the kick stand sinking into the ground and the bike tipping over. To solve this problem a Soft Surface Kick Stand (SSKS) was created. The SSKS uses a large plastic foot pad that is retracted when kick stand is up (not in use) and extended to contact the ground when down. A suspended spring at the center of the stand tube both allows the pad to move (retract and extend) as well as holding the kick stand in the up or down positions. A small cable connects to the upper portion of the spring and is re-directed by small pulley's to transfer spring forces to the desired angles. The SSKS along with the lowered center of gravity of the Anomaly design greatly reduces the kick stand tip-over problem in any condition.



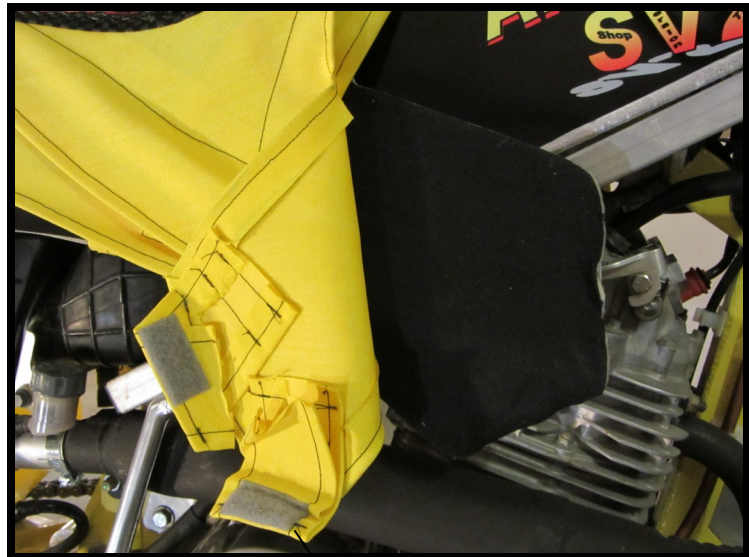


Soft Surface
Kick Stand



Seat Cover-

The (fast forward-play-rewind) seat cover for the Anomaly SV2 is designed to be quickly and easily removed/replaced. The front and rear of the seat base have tabs that provide a restraint for each end of the seat cover. On the lower front and sides are locations to tension and wrap-around the seat cover over the seat frame. On the back side of these wrap-around surfaces is a Velcro pad. The Velcro secures the seat cover to the seat frame (form). This design is very advantageous for easy replacement of the seat cover. For a person who just wants to add a custom look by changing the seat cover or someone who needs to easily replace a damaged seat cover, this design provides an easy way of changing the cover!



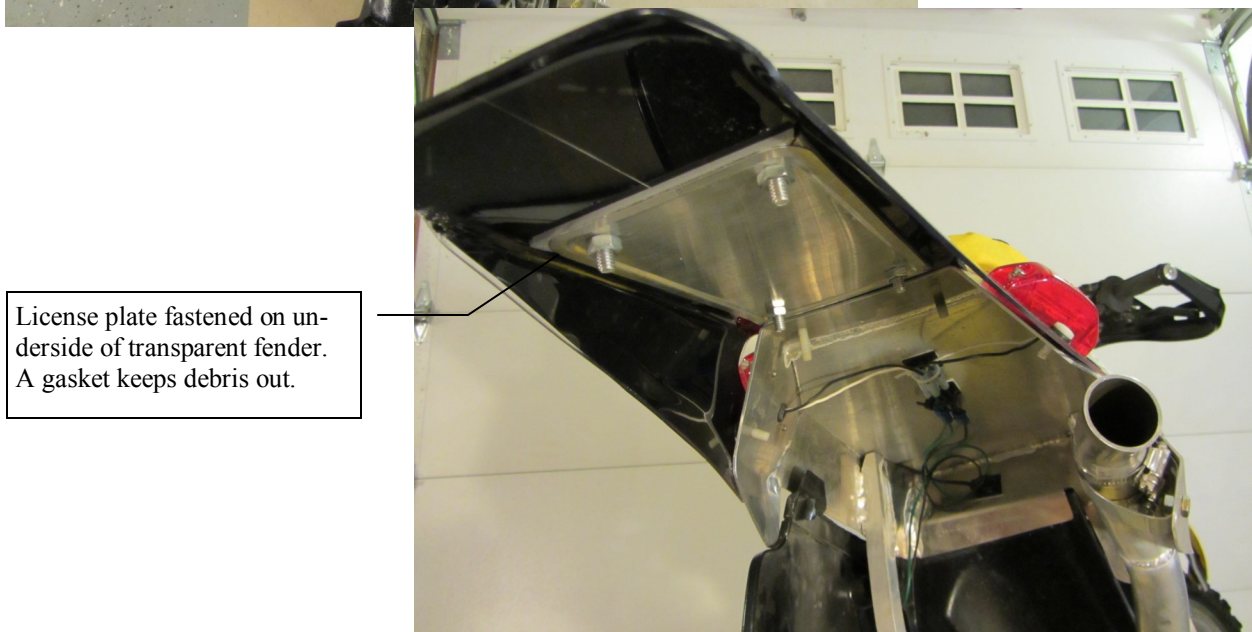
Velcro on cover wraps around aluminum seat base

Rear Fender-

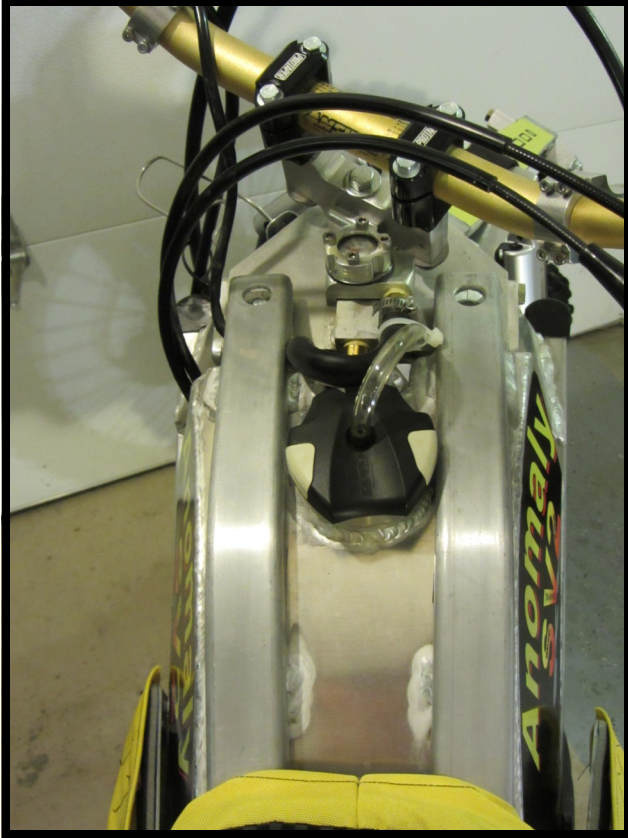
Most recently Idaho has required the use of a license plate to ride off road motorcycles on Idaho country roads. Typical dirt bikes don't accommodate a license plate well. Leaving plate edges and fasteners where they could hurt the rider in an accident. The Anomaly SV2 contains the solution to these issues with a transparent rear fender. The license plate is mounted on the underside in the wheel well area thereby utilizing the fender as a barrier between the rider and the license plate. The license plate is mounted with rounded head fasteners on the rider side to minimize any potential for injury to the rider. A gasket keeps debris from getting between the fender and the license plate. This type of fender could be developed for almost any current dirt bike.



Black decal sheet makes the transparent fender material black.



License plate fastened on underside of transparent fender. A gasket keeps debris out.



The End

