

Podium Newsletter

October 2010



Welcome to the Podium Club!

The information found at www.antiquetractorpullguide.com is like no other information out there. The tips, tricks and secrets of successful tractor pulling are designed to improve your performance at the next tractor pull, while having more fun at the same time.

Turnbuckle Style Hitch Adjustment – Advantage or Myth?

Probably since the beginning of competitive tractor pulling there has always been a debate over hitch design. Most notably, the turnbuckle style hitch, or hitches with support points attached higher than the centerline of the rear axle have always fallen under scrutiny as possibly allowing an “unfair advantage”. Folks are worried about the “added force” that could be applied to the upper attachment points of the turnbuckle. The hitch appears to be pulling from way up high, but is it really? The real question is.....does this yield an unfair advantage?

See below examples of turnbuckle style hitches:



Notice in each of these examples, the hook point is supported from above.



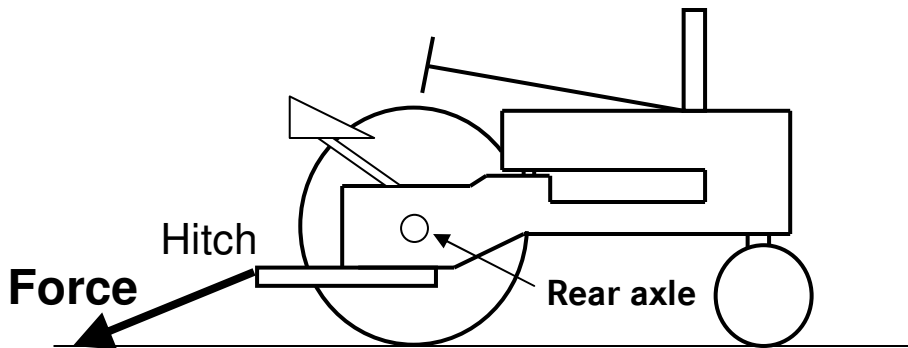
Also note the height of each hitch is adjustable using screw threads.



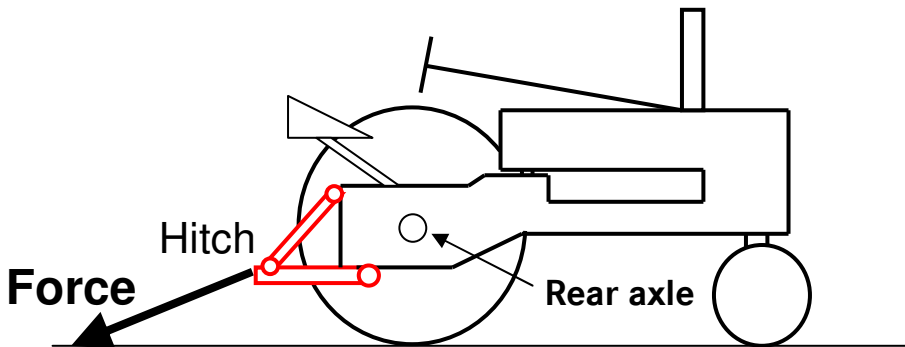
Turnbuckle Style Hitch Adjustment – advantage or myth? (cont)

Now, let's assume the hook point is rigid in all directions (as most rules state). From a physics standpoint, **it is only the location of the hook point itself that dictates the actual reactions at the hitch.**

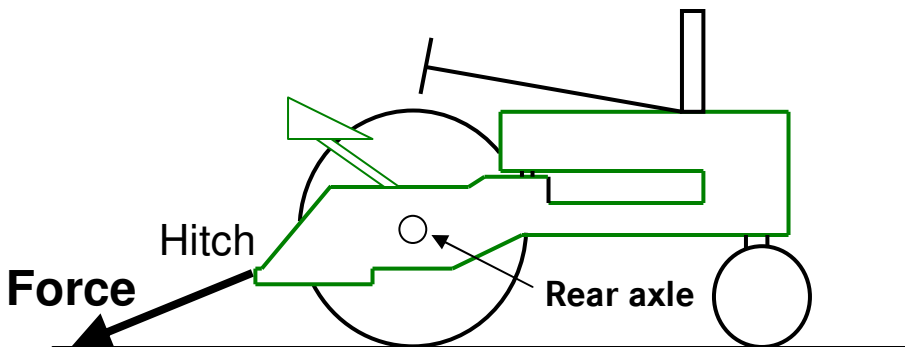
In other words, it doesn't matter if the hitch is supported from above because **the forces on the hitch act at the hook point as if the entire tractor were a rigid body.** See diagrams below:



Tractor with rigid drawbar, **no deflection under load** (side view with right wheel removed)



Tractor with adjustable drawbar with pin connections (still rigid)

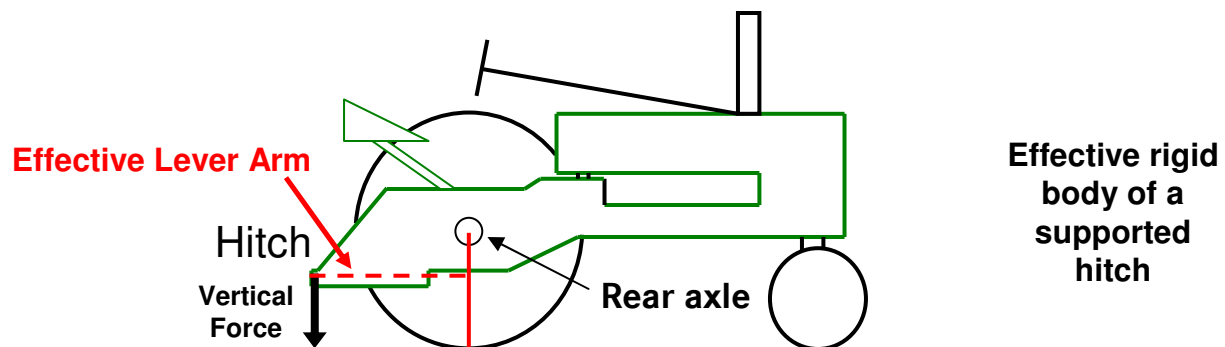
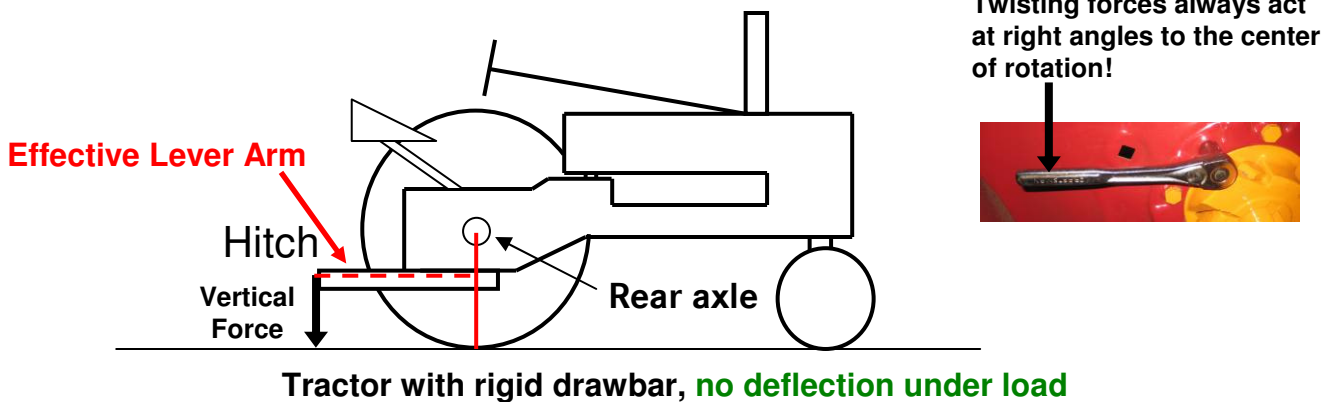


Effective rigid body the force acts on



Turnbuckle Style Hitch Adjustment – advantage or myth? (cont)

Let's look at the vertical component of force for both hitch cases (for explanation of hitch forces, please review The Antique Tractor Pull Guide). When a force acts on a lever arm, such as the vertical force of the hook on the drawbar, the "effective lever arm" is always at a right angle to the axis of rotation. Whew! What a mouthful! In simple terms, the effect of downward force on the hitch only acts horizontally on the rear axle. See diagrams below.



Notice in both cases **THE FORCE AND LEVER ARM ARE EXACTLY THE SAME**. This means that it makes no difference in distance on the track whether a hitch is supported from above or not. Again, this assumes that the hitch is rigid in all directions.

The one concern with turnbuckle style hitches is safety. If, for some reason the hitch were to break away from the lower attachment point on the tractor, then the pulling force would be transmitted through the upper links and a potentially

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Turnbuckle Style Hitch Adjustment – advantage or myth? (cont)

dangerous wheelie may result. The likelihood of a well built hitch breaking in that manner is very, very low. Possibly the safest way to build an adjustable hitch using turnbuckles is to not have them attached to the actual hook point. For example, the picture below shows vertical adjustment using turnbuckles that support the drawbar, but not the actual hook point. If, for some reason the drawbar ever became unattached underneath the tractor, it would likely pull straight out the back horizontally and not cause an unsafe condition.



At right is example of the turnbuckles supporting the hook point directly. Again, if a hitch is well built, as this one is, there should not be any concerns about hitch failure.

To sum up, turnbuckles are a simple and effective way to make a strong adjustable hitch and **do not yield any advantage** on the track over other designs.



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Winter Project details

Last month's Podium Newsletter introduced two winter project tractors that will be built for the 2011 pulling season. Let's start with a little history to get familiar with these tractors.

The two tractors are a Minneapolis Moline ZTU and a Massey Harris 101 Twin Power. Here are the specifications for the Moline:

Minneapolis Moline ZTU

Engine Bore: 3.625"

Engine Stroke: 4.5"

Number of cylinders: 4, side valve type engine

Engine displacement: 184 cubic inches

Rated Engine RPM: 1500

Horsepower as tested at Nebraska: 26.39 drawbar, 31.14 belt

Number of forward gears: 5

Stock tire size: 12.4-38

Stock weight without driver: 3528lbs



The MM ZT series tractors replaced the J series Twin City tractors in 1937. The new ZT tractors featured MM's "Visionlined" styling, with Prairie Gold Paint and "Red Nose". Production of the ZT series continued until 1948 and for the 1949 model year, the model ZA was introduced. The ZT and ZA tractors are similar, but the biggest differences are in appearance and engine size. The ZA had virtually the same engine, but featured a ½" longer stroke, giving it 206 cubic inches. This engine size was carried through the ZB series, which was virtually the same as a ZA tractor, only with a foot clutch and high operator's platform. All three of these models, the ZT, ZA and ZB featured a "side valve" engine, where the valves were mounted in the cylinder block perpendicular to the piston travel, and the engine had more or less a flat head. These engines produce fantastic torque and make good pulling engines, but they do have their limit.

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Winter Project details (cont)

In 1956 Minneapolis Moline introduced the 445 tractor, which replaced the ZB. The 445 was a much more modern machine and the 206 side valve engine had been changed to an overhead valve engine. This engine was carried through to the 4 Star tractors, which were introduced in 1959 as the 445's replacement. By then, the 206 engine had become very efficient and was rated at a faster engine speed of 1750rpm. Nebraska tested the 4 Star and found it produced around 45hp at the pto. Production of the 4 Star ended in 1963 and the U-302 tractor was introduced in 1964. For the U-302, the engine bore was increased to 3.75" and the stroke kept the same at 5". This made a 220 cubic inch power plant, and rated at 1900rpm it produced about 56hp at the pto. The U-302 was built through 1970.

Now, as most tractor companies did, MM kept the basic engine design the same, choosing to evolve and refine their products instead of drastically retooling. This is good for antique tractor pullers, since many newer model engines will simply bolt into an older tractor. Well, believe it or not folks, the later 220 like the one used in the U-302 tractor will bolt into an early style tractor like a ZTU. That's the direction this project will take.

The idea here is to simply bolt in a running engine and go have fun pulling. This, of course, is in lieu of doing a complete engine rebuild, boring, stroking, etc., etc. It's an easy way to make a tractor competitive, but must comply with the rules. Luckily in our area, the rules state that another engine may be bolted into a tractor, as long as it's from the same manufacturer and is a direct fit (as in no adapter plate).

So the recipe goes like this – bolt a 220 power unit engine into a ZTU tractor, get a little bit bigger tire and go have fun. Only one word can describe this combination – “nasty” on the pulling track. Stay tuned for detailed updates.

MM ZA



MM 445



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Winter Project details (cont)



1948 Minneapolis Moline
ZTU

Running 220 power unit,
originally from a forklift



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Winter Project details (cont)

Here is the other tractor that will be compared to the MM ZTU – it's a 1938 Massey Harris 101 Twin Power. The 101 Twin Power was introduced in 1938 and 101 production continued through 1946. Here are the spec's for the early 101 Twin Power:

Massey Harris 101 Twin Power

Engine Make: Chrysler

Engine Bore: 3.125"

Engine Stroke: 4.375"

Number of Cylinders: 6, flathead type engine

Engine displacement: 201 cubic inches

Rated Engine RPM: 1500 Drawbar, 1800 belt

Horsepower as tested at Nebraska: 31.50 drawbar, 40.67 belt (1800rpm)

Number of forward gears: 4

Stock tire size: 11.2-36

Stock weight without driver: 3600lbs



The Massey Harris 101 series went through several changes. The early Twin Power 101 was upgraded to the "101 Super" in mid 1940. Styling remained the same with full engine side panels, but the engine was upgraded to a Chrysler 218 flathead, which was virtually the same engine with a 1/8" larger bore. In late 1943, Massey Harris drastically changed the sheet metal styling of the 101 series and again changed the name to "101 Senior". Not only was the appearance changed, a new power plant was used – a Continental F226 flathead in place of the Chrysler. The F226 (226 cubic inches) was used throughout 101 Senior production, which ended in 1946. For the 1947 model year, the 44-6 was introduced, using the same F226 engine with a 5 speed transmission. The 44-6 production ended in 1951.

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Winter Project details (cont)

So what is the power upgrade for a Chrysler powered 101 Twin Power? Another Chrysler engine, of course! Chrysler made several versions of their flathead engines, both industrial and automotive. There were two block sizes – a small block and a big block. Both look very similar in appearance, but the easiest way to tell them apart is by the length of the cylinder head. The small block engines have a 23” long cylinder head, while the big block engines have a 25” head.

Some of the common sizes of small block Chrysler flatheads were 201, 218 and 230 cubic inches, with the 230 as the most popular. The big block Chryslers were 237, 251, and 265 where the 251 was the most popular. The largest displacement these engines were built in was 265 cubic inches.

So where could a guy find a big block Chrysler engine for a pulling tractor? The 251 engine production started in the late 1940’s, and was used in Chrysler cars, DeSoto cars, Dodge pickups, military vehicles, and other industrial equipment. The 265 engine became available around 1951 and could be found in Chrysler Windsor cars, and bigger Dodge trucks, and other industrial applications. The tricky part of putting one of these engines into a tractor is the manifold. Most automotive and industrial applications used downdraft style manifolds and carburetors. This setup is just too tall to fit under the 101 hood, but there was an updraft version available.

One place the 265 engine was used was on later Massey Harris and Massey Ferguson combines. The model Super 92 combine used this engine as a power plant. In that application the 265 was rated at almost 1900rpm and around 60hp, and has an updraft style manifold.

The good news is that any of the big block Chrysler engines will bolt into a 101 frame and provide an instant boost in power. It’s not quite as efficient as an overhead valve setup, but can be just as potent on the track as any six cylinder Oliver out there.

So here’s the recipe for the 101 – Bolt in a 265 Chrysler and a bit bigger tire and go have fun pulling.

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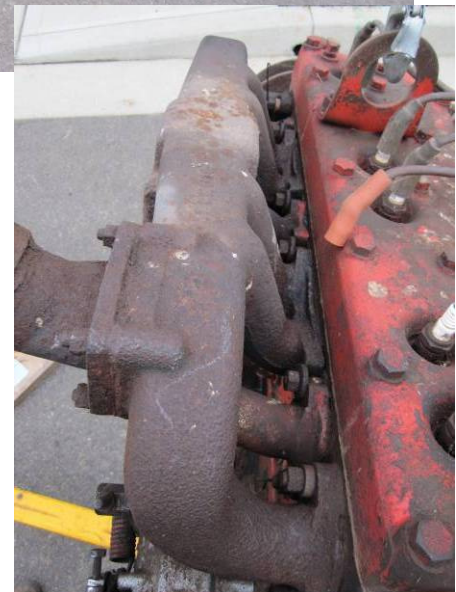


Winter Project details (cont)

Here is a picture of a recently purchased Chrysler 265 industrial engine out of a Massey combine. Note the belt driven governor. The engine is 3.4375" x 4.75" bore and stroke.



The original 201 engine in the 101 Twin Power.



265 updraft style manifold

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Winter Project details (cont)

More than just concept! Stay tuned for the detailed “how to” installation of each of these engines – the 220 in the ZT tractor and the Chrysler 265 in the 101 Twin Power, plus weight brackets, hitches and more!

1948
Minneapolis
Moline ZTU



1938 Massey
Harris 101 Twin
Power

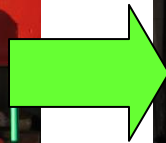
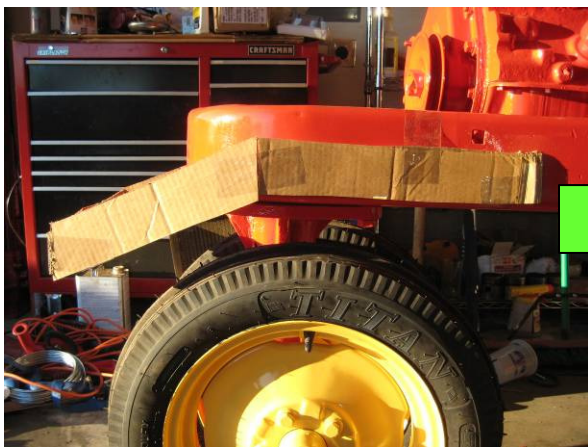


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Building a “Drop” style front weight bracket: Part II - The fabrication

From concept to creation – the Massey Harris Mustang’s front weight bracket is taking shape. Stay tuned in next month’s newsletter for the completion, plus a design for a removable extension to make hauling easier.



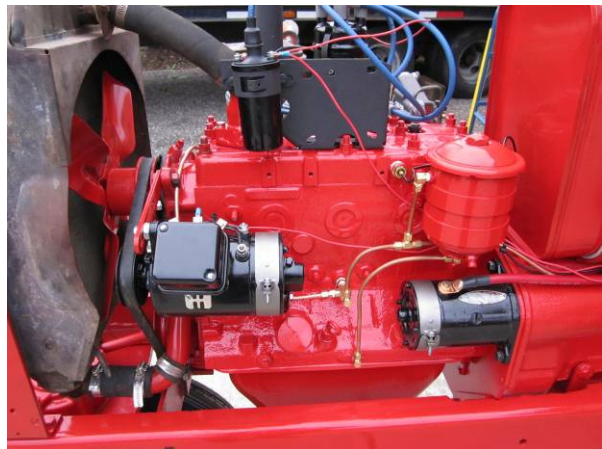
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Massey Harris Mustang Update

Two words – IT RUNS!!!

Final mechanical assembly is now complete and the tractor runs. The first start of the engine can be seen in the video library at www.antiquetractorpullguide.com.



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Coming next month...

- Winter project updates
- Building a removable front weight bracket
- Electronic Ignition, the easiest “how to” guide ever
- And more...

November issue will be available 11/28

I want to hear from you! If you have feedback, requests or information you would like featured, please send an email to: zack@antiquetractorpullguide.com.



Tractors waiting to hook at the NW Nationals Tractor Pull in Moses Lake, WA
October 15th-17th, 2010