

Galibier Design

Tool List





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Tracking Force Scales

About Scales

With some tonearm geometries, tracking force measurements can vary significantly, depending on how high the weighing surface of the scale is above the platter level.

One tonearm family whose readings are affected by weighing height are the Kuzma 4Point and Safir family. Refer to the next section: "How Do I Know?" to determine if your tonearm applies.

Scale warm-up produces minor variances as well (perhaps .02-.03 grams), so bear this in mind as well.

Ideally, a scale's measuring surface is at record level (1.5 to 2.0mm above platter level), but this is very difficult to manufacture.

These three scales in the photo below have a measuring platform that is approximately 5.5 mm above the platter surface.

The Neotech scale shown below is sold under various names on Amazon and is every bit as accurate as the Rega Atlas. The Riverstone scale is also available on Amazon.

You have two options if your tonearm's geometry mandates weighing at record level:

1. Refer to the "Compensating" section below.
2. Purchase a scale from a company like MyWeigh (<https://myweigh.com/>) and fabricate your own step-down beam. Purchase a scale with limited range (<100g.) hundredth gram precision.



How Do I Know?

A simple way of determining if your tonearm is sensitive to measuring height, is to measure your tracking force as you normally would.

Then, either raise the scale or lower your VTA by 3-4mm, to see if you get different readings.

Remember, that a 1 degree SRA change translates to raising or lowering a 9" arm by about 4.2 mm, so don't forget to restore your tonearm height!

Compensating

All is not lost if your scale doesn't measure the same tracking force at various weighing heights.

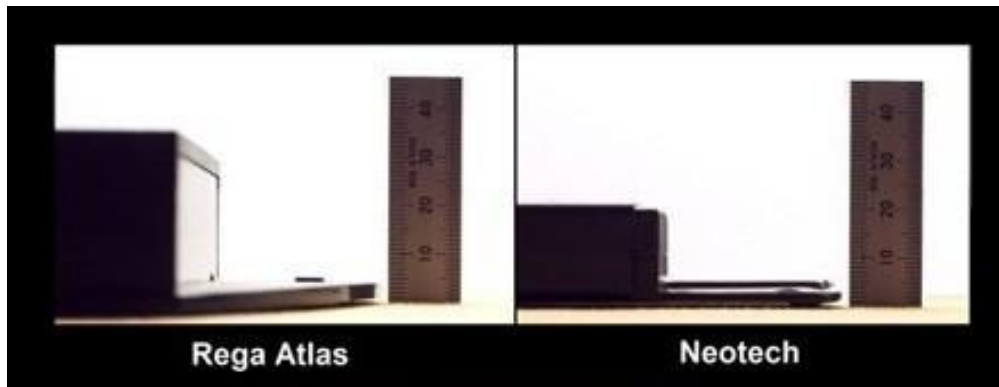
The following method is tedious, but it will work:

1. Determine how high the scale's weighing surface is and subtract 1.5mm from this number
2. Raise your VTA by this amount
3. Measure tracking force
4. Restore the VTA

Scales with “too high” Weighing Surfaces

Because their weighing surface is about 5mm above platter level, we don’t recommend the Rega Atlas or the Neotech.

They will work with the majority of tonearms, but their readings are skewed for Kuzmas and tonearms with similar geometry.



Recommendation: Riverstone Audio



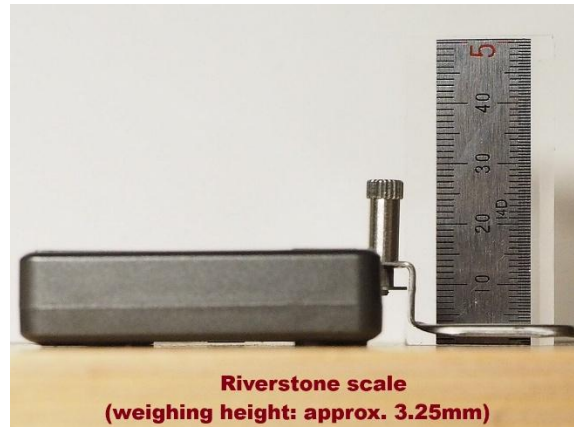
The Riverstone scale is the closest of the three and receives our qualified recommendation.

With Kuzma tonearms, readings vary slightly from our reference scale, as shown in the table below.



We noticed some slight bends in the step-down on our Riverstone beam and we straightened them so the weighing surface is about 3.25mm above the platter.





Below, is a comparison between our reference scale and the Riverstone – measuring tracking force with both the 4Point-9 and 11” arm wands. We checked scale calibration before performing this test.

The 4Points are a worst-case scenario and you’ll find most other arms showing smaller differences.

The small differences and non-linearities you see below are due to a combination of:

- sample to sample and brand to brand variation (the scale’s strain gauges)
- scale warm-up time
- the weighing height (above the platter surface)

In other words, our reference scale is no better than the Riverstone.

4Point-9	
Galibier Scale	Riverstone Scale
1.80	1.73
1.85	1.79
1.90	1.83
1.95	1.88
2.00	1.92
2.05	1.98
2.10	2.02
2.15	2.10
2.20	2.15

4Point-11	
Galibier Scale	Riverstone Scale
1.80	1.73
1.85	1.79
1.90	1.83
1.95	1.90
2.00	1.95
2.05	2.01
2.10	2.03
2.15	2.09
2.20	2.13

Hex Drivers

In our setup reports, we document the hex key size for the various adjustment screws found on tonearms.

Common sizes:

- Metric – 4 sizes: 1.5mm, 2.0, 2.5, and 3.0mm.
- Some American arms use imperial sizes – most typically .050", 1/16", 1/8" and 5/64".



The one addition we found to the above sizes is one of the fixing screws on Rega style cueing mechanisms.

They are either 1.2mm or 1.3mm.

Reaching for small “L-shaped” hex keys is always a guessing game, and we consider a set of 4 metric, screwdriver handle hex drivers to be money well spent for your toolbox.

Wera makes good drivers. Note that drivers come in both “flat” end and ball end.

Ball end drivers allow you to access the socket head screw from an angle which can be handy when working in tight spaces.



The smallest sizes (1.5mm and .050") can tend to slip and round off screw sockets, but sizes above that (in ball end) tend to work fine.

If you're choosing a set, then we recommend the flat end style (not ball end).

You'll find quite few sets for a reasonable price on Amazon. Use the search term: “hex driver sets”.

Here's another link: <https://www.kctool.com/wera-345273-kraftform-micro-hex-metric-precision-screwdriver-set/>



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Hemostats

Handy for affixing cartridge clips to the pins on your cartridge. Some people prefer to use tweezers. Curved and straight ones shown.

If you fly fish, you are likely to have a similar tool you can use as well.





Contact Cleaning and Treatment

Of course, this isn't limited to your vinyl setup, but given the questions we field on this, and the fact that signal levels on MC cartridges are so low, we included this section in our tool guide.

You can go to all levels of extremes with contacts, and we're reminded of an engineer who was on a recording site, experiencing "scratchy" pots. It was a Saturday night, and in a pinch, he went to the local liquor store and purchased a bottle of Everclear. He became a convert.

This exploded myths he had bought into. Ultimately, contact cleaning (as with everything else in audio) is a matter of reaching a reasonable level of satisfaction. In other words, don't let the perfect be the enemy of the good.

With that preamble out of the way, here's one practical solution.

Materials

Cotton tipped wood applicators (Q-tips) - good for cleaning:

- The male pins of your RCA plugs
- The outer barrel (ground sleeve) of female RCAs on the back of your electronics.
- Cartridge pins
- The DIN connector on your tonearm (a bit difficult to reach all surfaces)
- Binding posts, spade lugs and banana plugs

1. https://www.amazon.com/dp/B004KQDHFA/?coliid=I2US6J3VHGA8M5&colid=2VHDDXF3ZLAAL&psc=1&ref=list_c_wl_lv_ov_lig_dp_it
2. https://www.amazon.com/dp/B08FYSQ7RG?ref=ppx_yo2ov_dt_b_fed_asin_title



Soft pipe cleaners to clean the inside of chassis mounted, female RCA jacks (on the back of your electronics. They don't quite fit inside female XLRs:

1. These Dills cleaners are the best ones we've found. They're soft and there's less risk of scratching your contacts:

https://www.amazon.com/dp/B001D7VVE8/?coliid=I3N3Q9P8TBM4K6&colid=2VHDDXF3ZLAAL&psc=1&ref=ast_srl_ov_lig_dp_it

Note that Dills makes a more "scratchy" cleaner as well. Don't purchase those. You may find other brands, but the key takeaway is that they should be soft to the touch.

Tool for Cleaning XLRs: we're still in search of products that can reach into the female connectors.

Empty Nail Polish Bottles:

The Caig contact enhancer comes in a spray can and can produce quite a mess (overspray).

We spray a "blast" of G5S (see below for product details) into an empty nail polish bottle and use the brush to apply to the contacts.

Trust us. You don't want to use the spray method.

There are far too many empty nail polish bottles available on Amazon to enumerate. Here's one:

https://www.amazon.com/Refillable-Bottles-Transparent-Varnish-Containers/dp/B0DF2FJJ3V/ref=asc_df_B0DF2FJJ3V?mcid=b5e3172cafc03993bd8d0ea1515861a5&hvociid=10422738871412709565-B0DF2FJJ3V-&hvexpln=73&tag=hyprod-20&linkCode=df0&hvadid=721245378154&hvpos=&hvnetw=g&hvrnd=10422738871412709565&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9028890&hvtargid=pla-2281435177858&psc=1

Chemicals

Cleaning: Isopropyl Alcohol

1. **Isopropyl** (rubbing) alcohol from the drug store.
2. **Lab grade isopropyl - MG Chemicals 824:** we won't criticize you for going to the extreme:

https://www.amazon.com/MG-Chemicals-824-1L-Isopropyl-Alcohol/dp/B005DNQX3C/ref=sr_1_1?dib=eyJ2IjoiMSJ9.8TZy6AofRgDXL4SxXpUR3awLTqOmojbt3NoferF5LJjS3Y5G71qO_TNPkn7kZwiY6aejZ89BzvdIteoB2tGAFaPEswX91zYZ04pbd1Qa9u0EnJVMkYEkZshKm2SilgcN7T4S1KrAoLhmZkSUQqaN1tNymZsB7tvFzAjzgyW3MljCvg0sCbF6buTi a6v_Lw-daL5Lmob-SIkfPI0CCEwMhggCqpaO190HW0tqFm-U-3c.T4f9bSrsOTAMLNy3Zi4DEw6Mze8uKJIB4luf6RHxEME&dib_tag=se&keywords=mg%2Bchemicals%2B824&qid=1737754131&sr=8-1&th=1

We have not tried MG's spray contact cleaner **409B Electrosolve**.

We're watchful about chemical sprays in a household environment. We leave that to you, and your comfort level with the MSD (manufacturer's safety datasheet). Also, take note of that sound technician noted above, and his experiences with Everclear.



Treating – Caig Products

Caig Deoxit Gold G5S. Caig makes a host of contact products. G5 is the treatment product.

Don't confuse this with Deoxit G4 which is for cleaning corrosion, hydrocarbons and heavy pollution from an amplifier or mixing board that has years of use in cigarette smoke filled venues. We have not used it.

These products come in spray cans and can be both messy and wasteful, but the next item addresses this issue.

https://www.amazon.com/dp/B003A7KHK8/?coliid=I164NMIGC52MQD&colid=2VHDDXF3ZLAAL&psc=0&ref=list_c_wl_lv_ov_lig_dp_it

About Caig Products

Read more about Caig products on their website: <https://caig.com/>

Briefly, their products of interest are broken down into 2 categories:



Deoxit Gold (G5S)

This is the product of interest. You'll find different suffixes which refer to a different container and application method (G5S-6 has a 6-position spray nozzle for example).

A similar product (Deoxit Shield) is designed for outdoor use, and not necessary for indoors audio.

Caig correctly states that the spray can version we referenced above suffers quite a bit of overspray. You'll find yourself mopping the product off your components and shelf.

Note our method mentioned above, of spraying the Deoxit Gold into an empty nail polish bottle – for both neatness as well as saving product.



The “D” products (D5 and D100).

These are cleaners and we’re using alcohol in place of this category.

The “D” products geared toward restoration and components that have suffered corrosion and environmental abuse.

A typical use case would be a PA amplifier with 30 years’ service in a smokey blues bar.

Tool Fabrication – Azimuth Gauge

Background

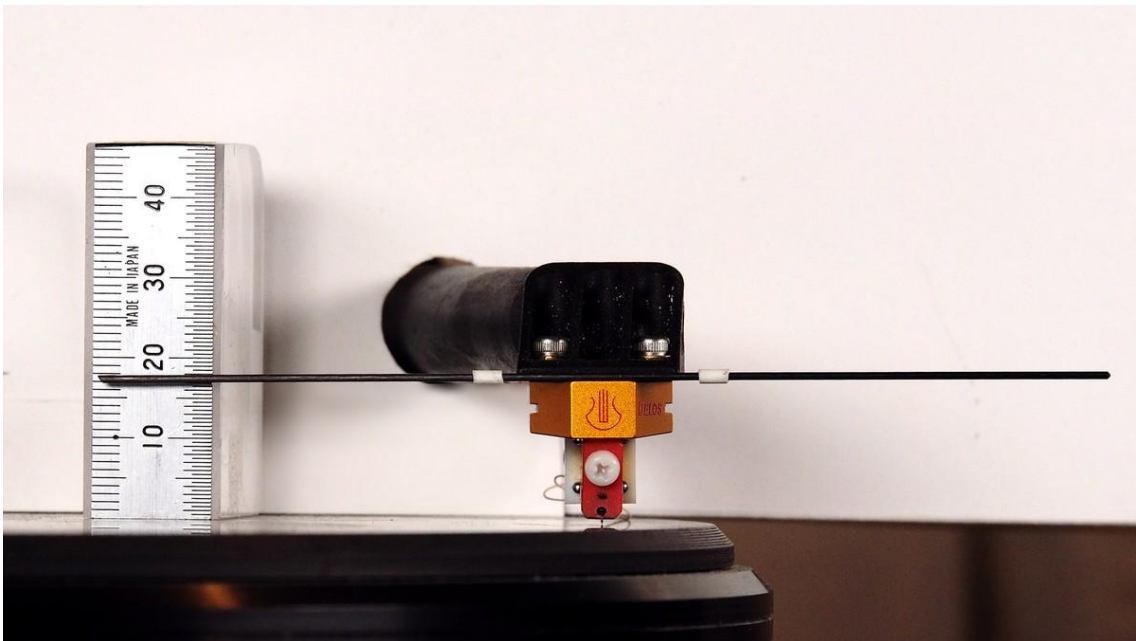
If you don't have an arm like a Kuzma 4Point, this tool will help you appreciate how difficult it is to make small, repeatable changes.

Owners of traditional, removable headshells will find it both beneficial and frustrating to make these small changes. For the first time, you'll realize how crude and haphazard your adjustments have been.

Various “measuring” tools have come out through the years. One such tool is the Acoustical Systems “SmartStylus” – a clear, acrylic block with etched reference lines.

Its primary use is for referencing a “level” headshell in either the VTA/SRA or azimuth planes. It's not very useful for measuring azimuth changes, however.

This is a photo of our tool in action:



Using the Gauge

The idea is that the carbon fiber beam magnifies the offset angle so you can more precisely and repeatedly measure and set it. We'll get to the parts list and construction in a moment.

The beam is a 1mm diameter, carbon fiber rod. These rods are remarkably straight, and with a bit of care, you can position them on the top of the cartridge's mounting surface as shown.



We selected a length of 4.5" (approx. 114.3mm) and we recommend you do so as well, for the following reasons:

1. It's long enough to provide enough "resolution" – magnifying the changes read on the height scale.
2. You'll have consistency with our measuring scale in case we make an adjustment on your cartridge remotely (without having your tonearm to set the azimuth).
3. You'll be able to replicate our setting remotely – once you gain facility with the tool.



Positioning the rod on the cartridge surface takes a bit of care (practice).

We found that fixing it in place with products like "Blu-Tack" to be more trouble than it's worth. With Blu-Tack, you're never certain that the beam is actually resting "flat" on the mounting surface of the cartridge (or the top of the headshell).

Your experience may differ, and we encourage you to use what works for you.

With a metric ruler, you'll find that you can adjust to within 0.25 mm on a repeatable basis. The 1mm diameter of the beam, combined with the scribed lines on the ruler make this intuitive.



Remember to correct for parallax when viewing the height.



Working with this gauge will take some time to master, but after using it, you'll realize how random your azimuth adjustments have been.

If you own a vintage style tonearm with a removable headshell, you'll quickly wonder how you ever lived without this.

Tools and Supplies:

- A hack saw
- An 8" or 10" Mill Bastard file
- Double-sided tape
- A sheet of 400 sandpaper if you purchase aluminum instead of acrylic – for deburring, after using the file

Notes

The list below is from Amazon, and of course, any source will do. Your total cost is about \$30-35 plus shipping (or 1/4 the price of the SmartStylus).

Ask us, and we'll build one for you.



Magnetic Material Warning

Beware of highly magnetic materials getting too close to your cartridge.

We looked into "1-2-3 machinist blocks" for this project, but we quickly dismissed this idea, as they can be magnetic.





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While the links below will age, you should still be able to find these with the information and thumbnail photos provided:

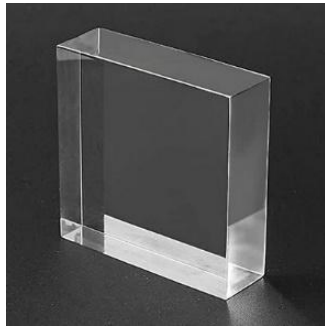
Length : 400mm / 15.7 inch

1mm Carbon Fiber Beams - 400mm long:

uxcell Carbon Fiber Rod — 10 pcs.)



https://www.amazon.com/dp/B07PB3VHTR/?coliid=I2MDMBUBUYQWWD&colid=2RTAEYQ3VOH6&ref_=lv_ov_lig_dp_it&th=1



Custom cut acrylic block:

Our instincts were correct, and acrylic is the best material for the job (non-magnetic, and no deburring required, as would be necessary for aluminum).

Search in Amazon for “Clear Acrylic Blocks”. At the time of this writing, we found one that is 1” x 2” x 2” – a bit larger than you need but not so large as to be difficult to use.

This link worked at the time of this writing:

https://www.amazon.com/Juvalle-Clear-Acrylic-Blocks-Pack/dp/B08R72Y3QV/ref=sr_1_7?keywords=acrylic+display+block&qid=1695881233&sr=8-7

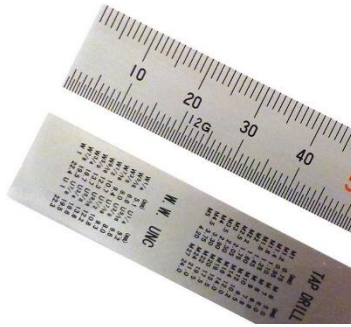
Every city has a plastic shop, and we’d specify dimensions of 5/8”x 1.5” x 2”. The ruler is about 5/8” wide, so 3/4” width would work as well.

Should you want to fabricate your block from aluminum, a custom cut will also cost less than \$10, but you’ll have to deburr the edges.

<https://www.onlinemetals.com/en/buy/aluminum-rectangle-bar>



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Stainless, 150mm metric ruler with .5mm gradations:

(my sample is mildly magnetic – see above)

https://www.amazon.com/dp/B00LYA3OBC/?coliid=IMDVRB0SGD92T&colid=2RTAEYQ3VOH6&psc=1&ref=lv_ov_lig_dp_it

Construction

The Measuring block

Note that while we fabricated our block in-house from acrylic, anything that allows you to position your ruler perpendicular to the record will do.

If you purchase a pre-cut block from acrylic, all that remains is to affix the ruler to the narrow edge.

Aluminum might require some light sanding to remove any rough edges – first, with your file, and then with a few passes of 400 sandpaper.

The Height Scale (cutting the ruler)

This involves cutting a stainless ruler to size, and affixing it to the reference block with double-sided tape.

A hack saw followed by smoothing the rough edge with a file is all you need, and the manufactured edge (the 0 mm side of the ruler) provides the precise reference surface you require.

The top side (the 46mm side in the photo above) is inconsequential, as you'll be measuring heights in the 15 – 23mm range.

Most cartridge mounting surfaces are about 17mm above the record surface, with the 21mm height of the Dynavector XV1s being the outlier.



Cutting the carbon fiber to length (4.5")

The rod is a bit brittle, but you have 10 pieces (400mm long) to practice with. We found that using a file to cut it to be the simplest. A hack saw blade is a bit too coarse and unwieldy for the job.

Cut it a bit over-sized and file it down to length.

The white stripes you see on our work piece are heat shrink. They're a nice, finishing touch for referencing the center of the beam, but are in no way necessary.

USB Microscope and Parts List

The Microscope

The scope we have been using is the Dino-Lite **AD4113T** 10x-50x, 220x Digital Microscope (approx. \$450).

This model has been discontinued and we're researching its replacement.

Two candidates are the **AM4113T** and **AM4113ZT**. The latter has a polarizing filter which we doubt will have any utility in this application.

The key consideration is whether the “nozzle” (the clear cap at the end of the scope) is removable.

For example, removing the nozzle on our AD4113T increases the working distance by about 9mm.

We require a working distance equal to half the width of the cartridge, plus some margin to take any headshell width into account. Some tonearms may have finger lifts which may further interfere. You're on your own in this regard.

Refer to the working distance in the “Charts” tab for these scopes. The 2.1mm distance at maximum magnification is too short, but this is where a removable nozzle comes into play.

Consult the Dinolite website: https://www.dinolite.us/products-category/usb-microscopes/?filter_pa-working-distance=&filter_pa-magnification=pt-20x-50x-200x&orderby=price&_gl=1*1jtllf*_up*MQ..*_gs*MQ..



Key parameters to consider are:

1. Magnification capability of 220 to 240x.
2. Working distance of 10-12mm which may require a removable “nozzle” to achieve focus at maximum magnification.

Stand Assembly

To achieve stability and ease of positioning, we recommend configuring a stand with Vernier adjustment in all three axes (X, Y, and Z).

The following 3 parts fulfill this requirement. Purchase a less expensive stand at your own risk:



MSRK-10A (\$269)

Table Top Precise Stand with Quick Release.

<https://www.microscope.com/dino-lite-msrk-10a-table-top-precise-stand-with-quick-release-1.html>

This provides the Z-axis (height) positioning).



MSRK-10-PX (\$99)

Precise Horizontal Positioning Arm for MSRK-10A Precision Stand

<https://www.microscope.com/dino-lite-flexible-extension-arm-for-msrk-10a-precision-stand-1.html>

This provides precise X-Y axis positioning.



MSA2T (\$30)

Vertical Use Adapter for MSRK-10A Stand

<https://www.microscope.com/dino-lite-msa2t-vertical-use-adapter-for-rk-10-stand.html>

It's actually the opposite. It allows you to orient the 'scope horizontally.

Setup and Use

Stand Positioning

Even with so precise of a stand, you'll go through a learning curve.

We'll complete this section shortly. The key takeaway is that the combination of your turntable shelf and the shape of your turntable base may present you with some positioning challenges.

We ended up fabricating a second base for our stand, since we can't anticipate what we'll encounter at a customer's house.

The Dynocapture Software

People are using this incorrectly, and we'll explain why. It's simplest to cover this topic in person.

Cartridge Manufacture

One of our favorite cartridge people on the planet (Jonathan Carr) explained the challenges involved in precision manufacture of stylus/cantilever assemblies.



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This is manufacturers' reply to a review of the Lyra Etna is a good read:

<https://www.stereophile.com/content/lyra-etna-mc-phono-cartridge-manufacturers-comment>