

SUMIKO  
PHONO CARTRIDGES

*Oriole*

Reference Series  
Moving Coil Cartridge

Dear Oriole Owner,

Congratulations on your new moving coil cartridge! We are very excited for you to enjoy the fruits of our labor. We set out to expand our range of Reference Series open-architecture cartridges because they're simply that good. In a more modern twist, we were able to achieve lower impedance through fewer coil turns of improved copper which raises the ceiling for sound quality. To maximize the potential of the low-impedance generator, the nude Shibata stylus was a no-brainer.

In the next few pages, we will take you on a tour of the design choices made during the development of the cartridge. The second part of the manual is intended to provide you with simple visual clues to help you get the best performance possible.

Sincerely,  
Sumiko Phono Cartridges

## Cartridge Setup - A Preface

The many considerations of proper setup can be overwhelming. For those who might feel unsure, we recommend contacting a local dealer for assistance. For those with more experience, we encourage you to proceed with your usual tools & know-how to whatever depths of precision you prefer. A simple 2-point protractor is great for getting up & running fast while a 3-point protractor encourages greater scrutiny of alignment. Recommended tracking force is a great standard for most, but others might find it worthwhile to explore the potential sonic benefits within the recommended range. Cartridge loading is flexible, so fine-tuning by ear is recommended. Optimal VTA might not be identical for each listener... and so on! What are we saying here? ...that each listener has varying gear, listening rooms, preferences, and *minds* to interpret what we hear. Thusly we advocate that you *trust your ears!* You are the authority on matters of sound in your system, and you know when your favorite songs are sounding their best therein. We say this as a reminder to keep it fun, whatever that might look like for you. Some may spend 30 minutes with setup, some may spend half the day. As long as there are no glaring issues and you're feeling fulfilled with your playback, you've done the job right. Happy listening!

### **Design Specifics - The Open Body**

To avoid distortion and coloration due to resonance build-up, the conventional cartridge body was eliminated. This allows for a design that most efficiently evacuates internal resonance through the structure of the cartridge and down the tonearm. Low mechanical impedance combined with the optimization of mass provides the perfect environment for the carefully selected working elements to execute their task.

### **Low-Impedance Generator**

Ultra-low-impedance (5.5Ω) is achieved through a carefully selected conductor and fewer coil turns of the same. This means there's less metal through which the signal travels and less mass in the moving coil assembly. The results are greater speed, improved attack, better dynamics and more detail.

### **Low-Mass Nude Shibata Stylus**

We selected the Shibata profile for its more even-handed approach to avoid fatigue. The nude construction reduces mass and eliminates a bonding point between the stylus & shank for improved and truer tracking. A greater contact patch between the stylus & groove enables better responses to tinier groove modulations, making micro-detail more available to your ears!

### **Reinforced Hollow Aluminum Cantilever**

Oriole's cantilever is made of a special alloy whose properties improve over off-the-shelf cantilevers. Harder and more rigid, it ensures low resonance and more accurately transfers the energy of the stylus to the coils. The hollow design further reduces moving mass.

### **PEEK Mounting & Terminal Plates**

Frequently used in demanding contexts such as aerospace, automotive & medical, PEEK offers extremely high mechanical stability that even outperforms certain metals. It effectively transfers internal resonance to the headblock, headshell and beyond.

### **Hand-Assembled in Japan**

Each Oriole cartridge is hand-assembled by the expert craftsmen of Excel Sound in Yokohama, Japan. This is a relationship we've sustained for nearly half a century. Great care was taken to ensure quality & precision every step of the way, from general assembly to winding the coils & tuning the suspension. You've got a world-class cartridge and we are excited for your forthcoming listening experience. Keeping with our Reference Series of open-architecture cartridges, we aim to bring you tonally balanced, refined & fatigueless sound to your system. Enjoy your vinyl!

## The Point of the Exercise

The purpose of fine adjustment of a phono cartridge is simple: you are trying to optimally align the playing surface of the stylus with the groove wall in the record, doing so in a way that the stylus is securely seated against the groove wall with neither too much, nor too little force, in all directions. All of these adjustments would be child's play if the stylus was the size of a baseball, and the groove was the size of a rain gutter.

The tricky part comes in the fact that the stylus is so tiny that no one can possibly see the scanning surface of the stylus (the part that actually touches the record groove) without the aid of a microscope. Add in the fact that the stylus is moving at the equivalent of about three hundred miles per hour and is being asked to maneuver faster than a Formula One race car and the problem becomes quite complex. Luckily, with a little patience and training, there is a grand equalizer: your ears.

So, let's get to it!

## Before You Begin Setting Up the Cartridge

### Preliminary User Note:

Before we begin, it might prove helpful to obtain an overview of correct set-up, why you are doing it, and what you hope to accomplish. This is not intended as a theoretical treatise, but merely as good, simple, practical tips on how to go about getting the most from your new Oriole.

**WARNING:** Phono cartridges are inherently delicate things. Work *SLOWLY*, and in a methodical fashion with lots of light and enough space to work comfortably. Rushing to make an adjustment is likely to have the unhappy result of, at best, performing a lousy adjustment, or at worst, damaging the cartridge. Don't forget the wisdom in the old adage, "There never seems enough time to perform a task properly the first time, but there is always enough time to do it again." Slow down and enjoy the process!

All of the adjustments we speak of in the following pages are small incremental adjustments. As a general frame of reference, virtually any change you make will be less than one-eighth of an inch. Some, such as vertical tracking angle adjustments, may end up being a few thousandths of an inch!

## Basic Mounting Instructions

There are two basic functions you are seeking to accomplish: physically bolting the cartridge to the tonearm and making the necessary four electrical connections to complete the audio pathway. Note: Make sure the volume control is turned all the way down or an alternative to the phon[ input is selected when you are making any electrical connection.

Handle with extra care! The U;ā|∧ does without a body for very apparent sonic reasons. As with any "nude" cartridge, additional care must be taken when installing the U;ā|∧. The extremely fragile inner workings, the nearly microscopic internal wiring, the motor assembly, and the cantilever, are exposed, requiring that the cartridge be held solely by the top mounting plate or the back plate that contains the connecting pins. Under no circumstances should any other part of the cartridge be touched, as permanent damage will occur. It probably does not need to be mentioned that his kind of damage is not covered under the warranty. So, again, please handle with care.

We prefer first to bolt the cartridge to the headshell, using the supplied stainless-steel mounting bolts. Next, attach the audio leads. The order in which you perform these tasks is functionally irrelevant, but if you should slip while trying to affix one of those tiny wires, at least the cartridge will not drop to the ground!

Using a pair of small needle-nose pliers or tweezers, fasten the color-coded audio leads to the appropriate color-coded pins on the cartridge. If the headshell space is limited, as it is on some tonearms, loosen the mounting screws and move the cartridge forward to give yourself more room to fit the wires. If you still don't have enough room, remove the cartridge entirely and then reattach the cartridge when you're done with the wiring.

### A Tip to Remember

One helpful little tip learned from a technical mentor years ago was to remember that "Christmas colors go together to form the right channel, and hot colors are 'hot.'" By this he means that red and white (red hot and white hot) are the positive leads, so white is left channel hot and red is right channel hot. To complete the Christmas color scheme, green attaches to right ground. The only wire left is blue which is, by process of elimination, left channel ground. We may have thoroughly confused you by this, but try it once or twice and it should make more sense.

### And the Setup Basic Term are ...

Before we press on too far ahead, let's identify the basic concepts and terms that define the setup procedure. Basically, there are four different alignment angles to be concerned with: 1. HTA, 2. Offset Angle, 3. VTA, and 4. Azimuth. There is also the pre-loaded weight of the arm

and cartridge combination, which is Tracking Force. Additionally, there is the amount of compensation required to counteract the inward pull developed by tracking a spirally-wound groove. This is called Anti-Skate. A discussion of these parameters will follow later on in this manual. Careful attention paid to the adjustment of all of these parameters, as described below, will result in optimal performance.

### **Setting Tracking Force**

Now that you've got the cartridge mounted and wired, the next thing you'll want to do is set the basic tracking force, or the amount of down force that will be applied by the stylus on the record. This setting not only determines the amount of stylus force in the record groove, but also loads the suspension system and aligns the coils to the yoke. This setting determines the tracking ability and properly aligns the coils to the magnetic field of the magnets, contributing to the linearity of the cartridge. The cartridge should be set to 2.0 grams of tracking force.

To set the tracking force, first balance the tonearm. Locate the counterweight. On virtually all pivoted tonearms, it will be located at the rear of the tonearm (meaning at the opposite end from the cartridge). Generally, it looks like a fairly large, shallow cylinder, usually black in color and often has numbers ranging from 0 to 3 or more grams printed on it. As you move the counterweight back-

wards, the cartridge end of the arm will lighten (reducing stylus tracking weight), while moving the counterweight forward will increase the stylus tracking weight. The first objective is to "statically balance" the arm, which is to achieve the proper weight balance such that the arm "floats" level. Practice a bit and you'll find it's fairly easy to achieve. Remember to exercise caution so that the stylus and cantilever are kept clear of any obstructions and are prevented from striking anything that could cause damage. After achieving static balance, adjust the counterweight to apply 2.0 grams tracking force by bringing the weight in toward the cartridge.

### **A Brief Discussion on Tracking Force**

Tracking force is primarily responsible for pre-loading the cartridge's suspension system so that it works optimally. It is useful to think of a cartridge's suspension as being similar to an automobile suspension. Too stiff a shock absorber on too light a car will result in poor dynamic performance and a rattley, uncomfortable ride. Similarly, a relatively stiff performance suspension on a phono cartridge, set at too low a tracking force, will result in performance that is bass light, and harsh sounding in the high frequencies. While the mechanical characteristics of the tonearm (how inert it is, how well it allows energy to pass through it, etc.) also bear on this, the tracking force is something we can exert control over.

## HTA (Horizontal Tracking Angle) and Offset Angle

We've combined these two categories because they are essentially interrelated. Other than to give a brief description of what you are adjusting for, we will leave these adjustment parameters to the maker of whatever tonearm you intend to use. The reason? Many tonearm manufacturers supply alignment templates with their tonearms and their tonearm alignment geometry may be maximized around this template. Briefly, HTA or Horizontal Tracking Angle is the fore/aft adjustment of the cartridge within the headshell (though some tonearms, like SME, use a fixed cartridge position in the headshell and require the entire arm be moved). By moving the cartridge position forward or backward in the headshell, the angle that the cartridge will describe over the entire playing surface of a record can be altered and optimized. Within the headshell the angle of turn-in required is a function of the amount forward or backward the cartridge is moved. Suffice it to say that obtaining a good alignment gauge and following its instructions is the best way to go about making these adjustments. Note: When the HTA alignment process is completed, remember to re-check the tracking force of the cartridge as any movement of the cartridge in the headshell forwards or backwards will change the tracking force value.

## Anti-skate Adjustment

It is now time to adjust for anti-skate. On all tonearms, the anti-skate is located towards the rear of the tonearm, in the vicinity of the bearing housing. The adjustment device typically takes one of the following forms. 1. A dangling weight hanging off the side of the arm, with some adjustment mechanism, such as slots cut into a fixed post. The further away from the tonearm the string is attached on that post, the greater the anti-skate applied. 2. More commonly, a dial with numbers printed on the dial face indicating 1, 2, 3, grams and fractions thereof.

Anti-skate, as defined earlier, is a force applied in such a way as to approximately counteract the inward pull created by the record's decreasing radius spiral groove. We say approximately because the record groove is constantly changing and no existing anti-skate is up to the task of correcting for all the non-linear forces present. The velocity of the groove changes with frequency, amplitude and position of the stylus, relative to the center of the record. As the velocity changes, so does the amount of inward pull being exerted on the stylus/suspension system. There is no way to completely and accurately correct for this dynamic situation. While it is common for manufacturers to suggest setting the anti-skate to exactly match the tracking force indicated (e.g., 2 grams tracking force equals 2 grams indicated anti-skate force), our data

suggests that an alternative approach is called for since the compliance of the suspension is not at all taken into account in this approach. In particular, modern moving coil cartridges, such as your cartridge, are lower in compliance and are not as affected by the vector force applied by the record's groove.

In the case of the Oriole, we suggest about 2/3 as much anti-skate as tracking force indicated, so in the case of the cartridge, about 1.25 - 1.3 grams anti-skate indicated. If more anti-skate is applied, the sound may begin to lose delicacy, and a sense of constriction will set in. Test records will not yield particularly good results because they are testing for worst-case scenarios. Using our method in real world conditions, the user will obtain higher average results. Going back to the automobile analogy, running a higher anti-skate setting is like driving on snow tires year-round on the unlikely chance you might run into a snowstorm. Additionally, some will recommend the use of mono records to set anti-skate. The problem with this method is that a mono record is cut quite differently from a stereo record. Additionally, some recommend a blank record, however this does not duplicate actual stereo record tracking either. Setting the anti-skate should be done in a real world situation and not a steady state or laboratory experiment simulation.

### **Fine Tuning, VTA and Azimuth are the Tricky Parts**

To this point, all the adjustments we've had you do have been relatively straightforward, intended to obtain and set a specific parameter. From this point on, though, the work becomes more qualitative and good judgment enters into it, as you will be called on to make assessments entirely subjective in nature. Relax and go slowly. It is unlikely that you will totally foul things up. With a little patience and finesse, you can obtain a much more musically satisfying performance from your turntable.

## The Line Drawings

As the saying goes, "a picture is worth a thousand words," so we chose to add some simple illustrations to this section of the manual for use as a guide, illustrating what your cartridge will look like when both properly and improperly adjusted for VTA and azimuth in your tonearm. Although there is no way to show you exactly what a perfectly adjusted cartridge will look like, the line drawings can serve to give you a mental template for your particular setup. Found on pages **19** and **22**, these line drawings will illustrate gross problems found in VTA and azimuth adjustments. Directly after the text on adjusting VTA and Azimuth, the illustrations on page **23** will allow you to see what your cartridge should generally look like when properly set-up.

For instance, if your particular cartridge sounds best with a more exaggerated negative rake, so be it. If the visual aspect of your particular cartridge looks as if the azimuth is tilted very slightly to one side, but this is the attitude that allows for the best sound, this too is okay. So, use the guide as just that, a guide. Explore the possibilities of what you can extract from your cartridge, and you will be rewarded with great music.

## VTA Adjustment

Vertical Tracking Angle (more precisely, Stylus Rake Angle) is the front-to-rear rake of the stylus within the groove and is controlled by raising or lowering the pivot end of the tonearm. Look for a small screw, possibly two, located low on the mounting collar where the tonearm meets the turntable. You should always refer to your owner's manual to familiarize yourself with all the functions of your arm, so now would be a good time to do that for this function. VTA adjustment's primary effect is upon the time domain behavior of the musical presentation.

Often, we hear and read about tonal balance differences attributed to changing VTA. But in the changing of the time signature, one necessarily affects the arrival of high frequencies relative to the low frequencies. The more one rakes a cartridge back, the more the high frequency content is "slowed" resulting in, to a point, subjectively richer, rounder sound. Inversely, raising the VTA will have the effect of sharpening up or focusing the sound; too high a setting and stridency results.

When you get very close on VTA adjustment, note that adding a touch more or less tracking weight (assuming your initial tracking weight is 2.0 grams) is a simple way of fine-tuning the VTA. Adding a tiny bit of weight is effectively lowering the arm height and reducing the weight will have the apparent effect of raising the back of the arm. Be careful, since adding force also changes the mechanical damping of the system as well as the relationship of the coils to the magnets. Still, for all but the most talented among us, adjusting the weight is, at the very least, a useful interim tool in fine-tuning VTA.

When adjusting by ear, we advise starting with the arm lower than necessary and slowly raise its position. Trying to start above the eventual point and lowering the arm is much more difficult to decipher. Please refer to the line drawings on the page **19**. On page **19**, illustration No. 3 shows a cartridge with 2° of negative cartridge rake, which is a good starting point for you to work with.

Remember, the time domain will not lie, and the ear is quite sensitive to time arrival cues, whereas trying to guess whether a piece of program material has too much or too little bass, for example, is an exercise in madness. When VTA is right, the sound will take on a properly large image scale (not bloated, simply full in size), with an easy

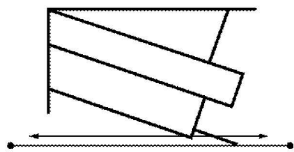
"breath" to the music that emulates the natural ebb and flow of live music. When wrong, the sound can be either too dull at one extreme, or pinched and small sounding at the other. Remember, you are working within a very small window of acceptability. The total height differential you are working with is perhaps 1/4" and that includes the "falsing zone", that area above and below the correct position that you will wind up finding by trial and error.

### **The Parallel Tonearm for VTA**

Modern convention suggests aiming for the armtube to run parallel to the record surface while the stylus is in the groove. This is perfectly acceptable and you will get great sonic results! Indeed it's what most users strive for and it's become something of an industry standard.

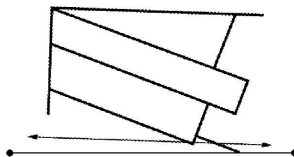
For those who want to explore by ear, an alternative method would be to start with a parallel armtube, listen, then lower the tonearm slightly and listen again. Using one of your favorite recordings, you'll be able to tell quickly whether it's closer to optimal. Plenty listeners find it beneficial, particularly for line-contact styli to reduce VTA slightly by lowering the tonearm.

**Illustration No. 1** shows a neutral attitude of rake. This is a widely accepted standard that delivers great sound for the breadth of listeners. For listeners who demand demand perfection, we encourage fine-tuning by ear.



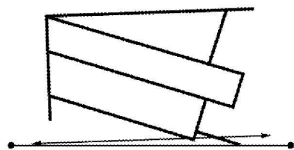
**0° Stylus Rake Angle**

**Illustration No. 2** shows a positive rake of 2°. A positive rake tends to bring high frequencies forward and can have negative effects in the time domain.



**2° Positive Stylus Rake Angle**

**Illustration No. 3** shows what a negative rake angle looks like. A slight backward tilt to the tonearm can open up the soundstage a bit and is worth exploring for critical listeners.



**2° Negative Stylus Rake Angle**

Please refer to the section in the manual titled **VTA Adjustment** (p.16) for further suggestions.

## Azimuth Adjustment

This is probably the most misunderstood adjustment in analog audio. We believe this stems from the fact that its primary effect can be relatively subtle, but when it is not precisely correct, its effect on other parameters such as VTA can be dramatic. As you can see from the diagram on page 22, azimuth describes the left-right angular orientation when viewed from the front of the cartridge. Necessarily this affects the balance of left-versus-right information, but not as dramatically as you might expect. Because of the tiny dimensions involved, its effect will be most noticeable in the lower treble (basic high frequency performance). Additionally, groove-tracing ability will be affected by incorrect azimuth adjustment, resulting in mistracking and contributing to poor high frequency performance.

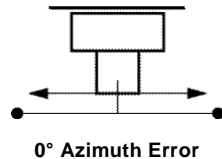
Your listening cue is to listen for stridency, sibilants, or an unusual metallic clang on instruments that do not normally produce a sibilant or clang. The sound of an unnatural "tssk tssk" on cymbals and other leading-edge transients, are telltale signs of misaligned azimuth. A very slight adjustment will correct for this problem. In grossly misadjusted arms will you hear an actual channel imbalance whereby the left channel actually sounds as though it is playing louder than the right, or vice versa.

Note: When you have achieved correct azimuth, the sound will take on a tidy, integrated character that simply sounds "right."

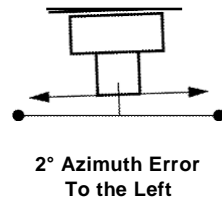
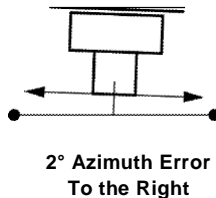
Some people have reported good results by playing mono records and listening for focus of image as a determinant for azimuth. We are reluctant to recommend this method, since the groove geometries of mono records are different from those of stereo records. We believe that a real world, dynamic set-up is the way to achieving a satisfying cartridge alignment, and using mono records to set-up for stereo records is not applicable.

Further experimentation will reveal that small changes made to azimuth may necessitate an additional slight change to VTA. This area is the trickiest part of fine-tuning. That is, the interactive nature of azimuth and VTA changes can be misleading. A legitimate improvement to one area can lead to a subjective degradation in another simply because an initial error has been exposed. As always, it is important to listen rationally and build up enough of an experience base so that you can easily determine whether the changes you made are a true improvement or simply an irrelevant alteration.

**Illustration No. 4** shows the attitude of the cartridge when the azimuth is set correctly. The bottom of the cartridge may be used to set azimuth by eye. However, the final setting will be done by ear.



**Illustration Nos. 5 and 6** show azimuth errors of 2°, tilted severely to the right and left. These angles may result in volume imbalances, biased toward the right or left channels.

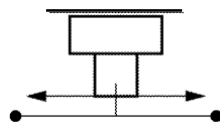


More importantly, this azimuth error will not allow proper tracing of the grooves resulting in mistracking. An edgy, hyper-detailed high-frequency sound will result if the azimuth is set wrong.

**Please refer to the manual section titled Azimuth Adjustment (p.20) for further suggestions.**

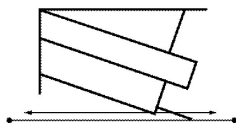
These illustrations show what the cartridge should look like when properly mounted and adjusted in the tonearm.

**Illustration No. 7** shows azimuth at  $0^\circ$  of error in side-to-side- tilt.



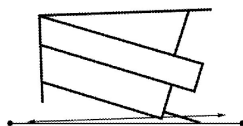
**$0^\circ$  Azimuth Error**

**Illustration No. 8** shows a rake angle, (VTA), of  $0^\circ$  where the tonearm runs parallel to the record surface.



**$0^\circ$  Cartridge Rake Angle**

**Illustration No. 9** shows a negative rake angle, (VTA), of  $1.2^\circ$ . An ever-so slight decline from headshell to pivot is an option worth exploring for critical listeners.



**$1.2^\circ$  Negative Cartridge Rake Angle**

## Wrapping Up the Installation

Now that your cartridge is set up properly, enjoy your music! You can expect the sound to change for the better across the first 20-30 hours of listening. Some listeners even report as many as 50 hours of break-in. It takes some time for the stylus and suspension hit their respective strides, so be patient and enjoy the ride. The suspension may settle once broken-in, so it may be worth your while to check your adjustment parameters again. This will ensure you're getting the best sound possible for the breadth the playing life. The most important principle is to *trust your ears!* With your equipment in your listening space and with your favorite music, no one is better equipped to determine how things *should* sound than you.

Only light maintenance is recommended. Keep dust off the stylus with a conventional stylus brush (cleaning back to front only!). Stylus cleaning fluids are recommended only from time to time. This prevents the build-up of tough grime & vinyl residue on your stylus. Using fluids too often may compromise the bond between the stylus & cantilever.

## Warranty

This product is warranted to be free of all defects in material and workmanship for one year from the date of original purchase by the original owner. A purchase receipt or other proof of original purchase will be required before warranty service is rendered. This warranty is not transferable and does not apply to any defects caused by negligence, accidents, misuse, modification, disassembly, or repair by other than the manufacturer, or by other than normal use for which this product was intended. Within the period of this warranty, Sumiko will repair or replace at our service center located at 11763 95th Ave N Maple Grove MN 55369, any part proving defective in material or workmanship. All expenses, except collateral expenses, related to replacing or repairing a defective part under warranty will be assumed by Sumiko, except for the cost of transporting and insuring the product to our above-named service center. The buyer must notify Sumiko of any defect, malfunction, or nonconformity promptly upon discovery. Within 30 business days after receiving the defective product from the buyer, Sumiko will repair or replace the defective part. We neither assume nor authorize any representative or other person to assume for us any other liability in connection with the sale or shipment of our products. We reserve the right to make changes or improvements in our products without incurring obligation to similarly alter products previously purchased. The buyer has the right to bring any action at law or equity to resolve disputes concerning or to enforce the provisions of this warranty.

## Oriole Specifications

Type: Moving Coil  
Series: Reference Series  
Stylus: Nude Shibata (6.5 $\mu$ m x 40 $\mu$ m)  
Tip Material: Natural Diamond  
Cantilever: Hollow, Reinforced Al ( $\Phi$ 0.5mm)  
Magnet: Alnico  
Coil Wire: Pure Copper  
Core: Pure Iron  
Internal Impedance (1kHz): 5.5 $\Omega$   
Load Impedance: >60 $\Omega$   
Frequency Response: 12Hz - 45KHz  
Output (3.54cm/sec @ 1kHz): 0.3mV  
Channel Separation (1kHz): 30dB  
Channel Balance (1kHz): 0.5dB  
Compliance (100Hz): 12x10<sup>-6</sup>cm/dyne  
Tracking Force Range (Rec.): 1.8 - 2.2g (2.0g)  
Tracking Ability (315Hz, 2g VTF): 70 $\mu$ m  
DC Resistance: 5.5 $\Omega$   
Internal Inductance: 11 $\mu$ H  
Vertical Tracking Angle: 20°  
Cartridge Mass: 7.3g

S U M I K O  
P H O N O C A R T R I D G E S

11763 95th Ave N Maple Grove MN 55369  
[www.sumikophonocartridges.com](http://www.sumikophonocartridges.com)  
+1(510)843-4500

Designed in the USA  
Made in Japan