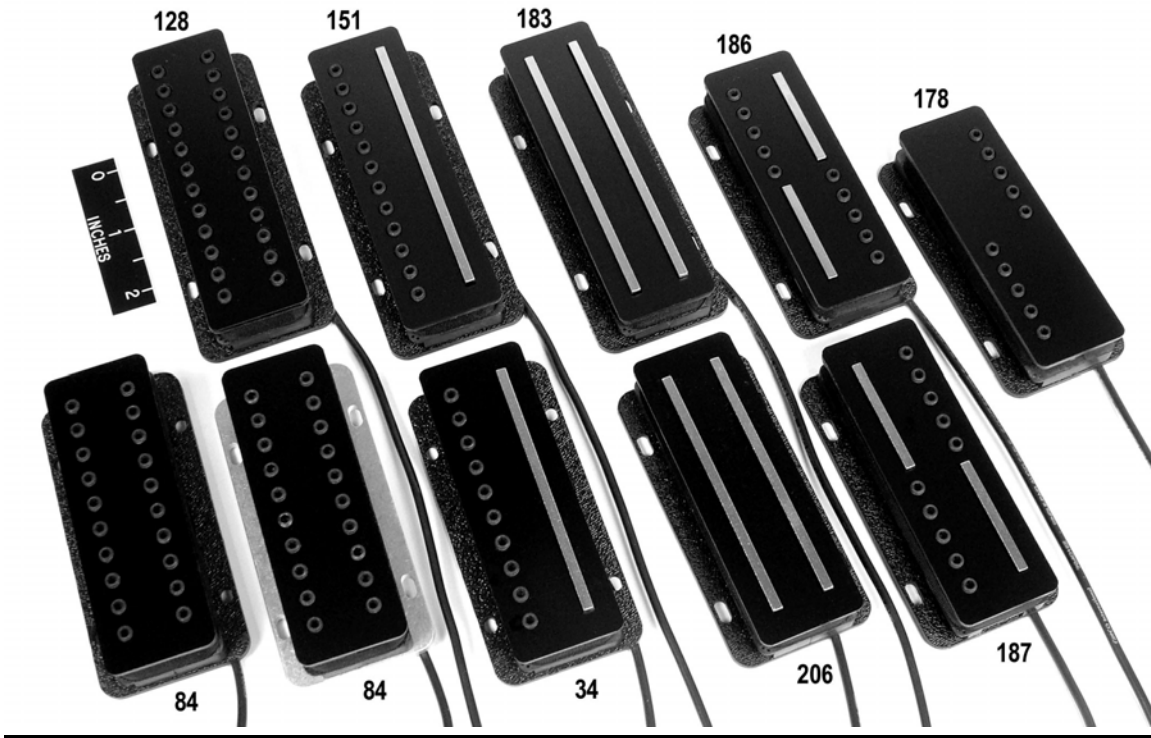




Installation and Usage Information



Electromagnetic Transducers for the Steel Guitar



Installation and Usage Information

for Telonics Pro Audio (TPA) Steel Guitar Electromagnetic Transducers

Background

Regarding “why” this pickup work was undertaken at Telonics, what was accomplished, and why the resulting pickup designs are considered to be superior to other pickups, some background is in order.

Basically, performers and manufacturers approached us relating that they needed “a really good pickup”.

They said that even if we would simply design and build pickups which worked no better than the best pickups currently available, but were **reliable**, and particularly, **consistent** from unit to unit, as well as to provide a replacement **warranty** and a high level of **service and support**, that would be what is needed. Of course if you know us, you know that would not be nearly enough for us to make the technological and monetary investments necessary. Our **mission statement** with regard to pedal steel guitar has, and will continue to be, **to only engage in areas where we feel we can significantly contribute to the technology and performance of the instrument as a whole**. Very simply, if we can’t make it work better or sound better, we are not interested in pursuing that area of development with out technologies. Before beginning any development efforts in the area of pickups, we first needed to thoroughly understand the origins of the current technology.

Of course in order to do this, we first had to fully understand what had been done in the past, study it in depth, and then translate that into hard engineering terms. This required an intense effort that included review of historical writings, patent studies from the 1920’s to the present, personal conversations with people who have had extensive experience “back in the day”, and many months of hands-on laboratory work correlated with untold numbers of listening tests in a controlled environment. The end products were then tested in live gigging and recording situations with live pro players. In the process of this effort, we developed special test and manufacturing equipment and defined some twelve (12) critical electrical characteristics necessary to make repeatability possible (none of them were DC resistance by the way), then we spent approximately 18 months correlating those measured electrical characteristics with the way a pickup actually sounds to the player and the audience. We found that we had to work through both the “black art” of the past as well as get past “doing it the way it has always been done” (we also found that people actually didn’t know why things were done as they were or why they are still being done the same way - unfortunately). We decided early on against proceeding without understanding what was going on and why – in terms of laboratory testing. We then set about designing improved electromagnetic transducers using the latest materials and processes including CNC and laser manufacturing, coupled with temperature/environmental quality assurance testing. We are currently in the early stages of incorporating our pickup line into our fully automated testing facility which measures and records all electrical parameters automatically on each and every pickup. As a consequence, we have been able to actually measure the improvement in performance as we proceeded. Our current pickups are the result of this hard work by a team of dedicated engineers (some of which are musicians) and many very helpful professional musicians. I can tell you that every pedal steel guitar in which we have installed these new pickups has, quite literally “come alive”.

We recently installed one of our latest designs into my own personal “player” guitar. I have been playing that steel guitar for the last 20 years and I would swear that it was not the same guitar – judging from the sound alone. It resonates like my old 1969 Emmons Push Pull cut-back and actually feeds “feeling” back to me, making me want to just play more and more. I have been told the same thing by other musicians who say that their audience can instantly tell the difference in the quality and excitement of their playing. In our opinion, that’s all we have a right to ask and it makes all the effort worthwhile.

Dave Beaty

Description and Characteristics

Type 84 and Type 128 Pickups (10 and 12 string models based on the same design)

Description

The Telonics Pro Audio Type 84 and type 128 pickups are advanced, high quality (10 and 12 string respectively), humbucking electromagnetic transducers designed to convert string movement characteristics to electrical signals. Their design represents over 2 years of laboratory research into prior work and related patent documentation from 1934 to the present. They utilize 20 and 24 individual pole adjustments respectively, two for each string. Although the basic configuration of this design has been utilized in many forms over the past 75 years in microphone and 6-string instrument designs, the Type 84 and Type 128 represent the application of modern materials, processes, assembly techniques and quality assurance which, for the first time, assures absolute consistency of desired characteristics. TPA pickups, like all Telonics products, are unconditionally guaranteed against defects in materials and workmanship.

Characteristics

As delivered, the Type 84 and Type 128 models produce a full bandwidth audio spectrum with balanced top end, full bottom end and exquisite string separation. They are specifically well suited for E9th and related extended tunings. The basic design provides an inherent “life and feeling” to the performer as-supplied with the poles adjusted identically. However, they begin to really shine and come into their own when the magnetic poles are properly aligned in accordance with the adjustment procedure supplied in the TPA pickup installation and usage manual.

In general, the higher tuned strings are adjusted for clarity and “bell” sound while the lower strings are adjusted for crisp fullness and “growl”. The poles are arranged in pairs, two for each string. Each pair of poles must first be adjusted together for simple volume level balance. Each pair may then be intentionally unbalanced (moving one pole up and the other pole down exactly a like amount as directed by the alignment procedure) to change/improve the voicing of a particular string. When properly adjusted, these pickups respond wonderfully when played more aggressively, producing clear notes with wonderful character which cuts through a mix clearly (whereas many pickups tend to become “muddy” when pushed). One of the greatest players in the steel guitar field once said that he liked “tone with hair on it”. These pickups produce those tonal characteristics while also providing an exceptionally high level of noise immunity to 50 and 60 cycle electromagnetic (“hum”) fields.

Note that if mis-adjusted, these pickups can produce excessively cutting highs!

Type 34 and Type 151 Pickups (10 and 12 string designs respectively)

Description

The Telonics Pro Audio Type 34 and Type 151 pickups are advanced, high quality (10 and 12 string respectively), electromagnetic transducers designed to convert string movement characteristics to electrical signals. These designs represent over 2 years of laboratory research into prior work and related patent documentation from 1930 to the present. They utilize a single blade pole and 10 (or 12) individual pole adjustments, one for each string. Although the basic configuration of this design has been utilized in many forms over the past 80+ years in microphone and 6-string instrument designs, the types 34 and 151 represent the application of modern materials and assembly techniques which, for the first time, assure absolute consistency of desired characteristics and quality assurance. TPA pickups, like all Telonics products, are unconditionally guaranteed against defects in materials and workmanship.

Characteristics

As delivered, the Type 34 and Type 151 models produce a high output audio spectrum with a very hot bottom end, ringing highs and excellent string separation. They are specifically well suited for C6th and Universal tunings, although experienced players sometimes choose to use the Type 34 on the E9th neck as well. These two designs provide an inherent “life and feeling” to the performer as-supplied with the poles adjusted identically. However, the tonal characteristics are further improved when the 10 or 12 adjustable magnetic poles are properly aligned in accordance with the adjustment procedure supplied in the TPA pickup usage and installation manual.

The type 34 and type 151 pickups must be installed such that the blade is on the side facing toward the neck/tuning keys. The adjustable pole screws must be on the side closest to the changer mechanism.

In general, the volume balance between strings is first adjusted by positioning the height of the entire pickup using the long horizontal single blade pole. The individual strings are then adjusted for volume balance and tonal characteristics using the adjustable pole for each string.

Generally, the poles under the higher pitched strings will be moved downward, or away from the string to reduce extreme highs, while the adjustment poles for the lower strings will be adjusted upward toward the bass strings for crisp fullness and “growl” as directed by the procedure to change/improve the voicing of a particular string. These pickups are superb for the player who knows how to use the “boo-Whah” pedal.

Note that if mis-adjusted, the Type 34 and Type 151 can produce excessively cutting highs!

Pickup Model Number Format

TPA pickup models numbers are comprised of:

- a numeric design type number, followed by
- the mounting plate material designation, followed by
- the mounting plate dimensional format, followed by
- the serial number.

For example 84AW 1724 indicates a model 84 pickup design supplied with an Aluminum Wide-mount base plate, serial number **1724**.

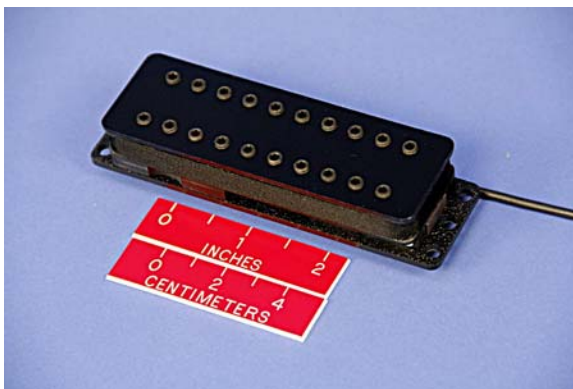
Special base plates (such as fitted for an MSA slide-in pickup holder), results in a number such as 84A MSA 1724 because the Aluminum base plate is neither wide nor narrow, but rather especially fitted to mount to an MSA pickup carrier.

Pickup Design Types released to production as of 12/06/11

Humbucking Types

Screw Pole Adjustment Only Humbucking Types

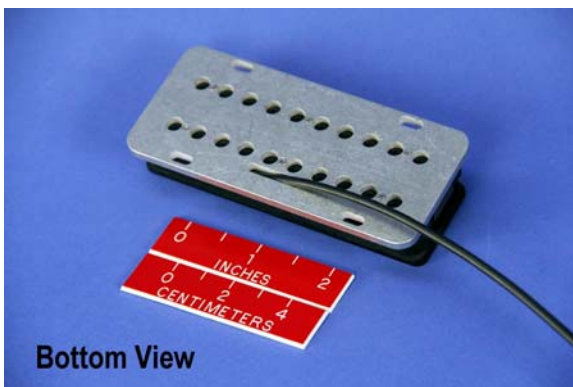
Type 84 (10 string-20 (Poles))



Type 84PN – Polymer Narrow Base

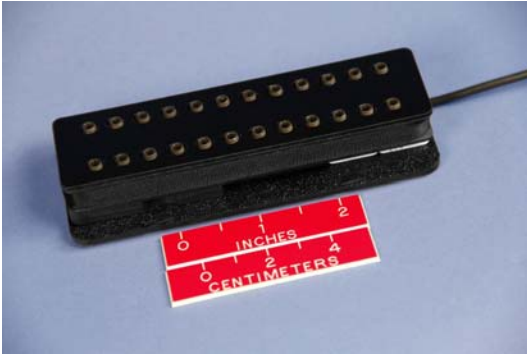


Type 84AW – Aluminum Wide Base

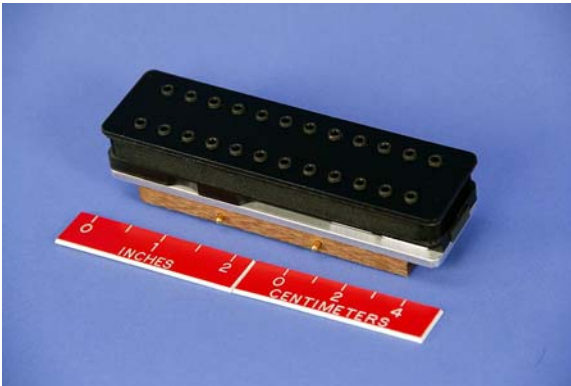


Type 84AW – Aluminum Wide Base

Type 128 (12 string – 24 poles)



Type 128PW – Polymer Wide Base



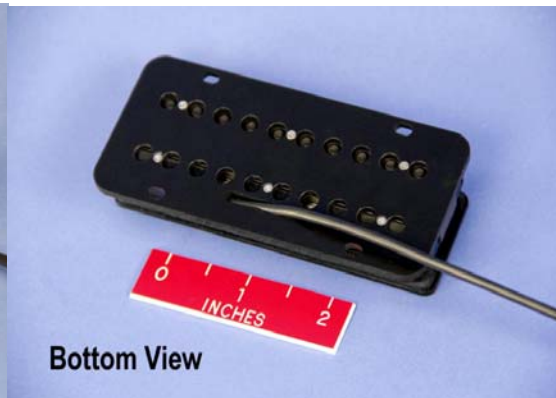
Type 128 MSA (12 string-24 poles) – shown on MSA slide-in mount

Single Bar with Screw Pole Adjustment Humbucking Types

Type 34 (10 string-10 poles plus bar)



Type 34PW – Polymer Wide Base



Bottom View

Type 34PW - bottom of Polymer Wide Base

(Also available as Type 34PN – Polymer Narrow Base)



Note: The Type 34 pickup is currently not available with an aluminum base

Type 151 (12 string -12 poles plus bar)



Type 151PW (12 string -12 poles)
(Also Available as Type 151PN – Polymer Narrow Base)

Note: The Type 151 pickup is currently not available with an aluminum base

Double Bar Humbucking Types (no pole adjustments)

Type 206 (10 string), Type 183 (12 string)



Type 206PW (10string)
Also available as Type 206PN
(with Polymer Narrow Base)

Type 183PW (12 string)
Also available as Type 183PN
(with Polymer Narrow Base)

“Zee” Bar Humbucking Types (with pole adjustments)

Types 186 and 187 (10 String Only)



Type 186PW RIGHT Hand Zee (10 string)
Also available as Type 186PN
(with Polymer Narrow Base)

Type 187PW LEFT Hand Zee (10 string)
Also available as Type 187PN
(with Polymer Narrow Base)

Special Single Coil (with offset pole adjustments)



Type 178PW (10 string)
(Also available as Type 178PN – Polymer Narrow Base)

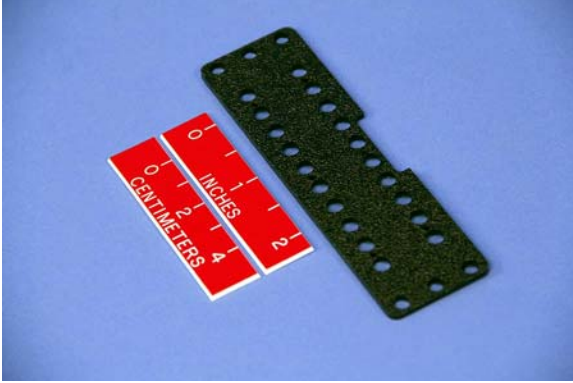
Mounting Plates

Depending on the pickup design type, one or more mounting plate options are available:

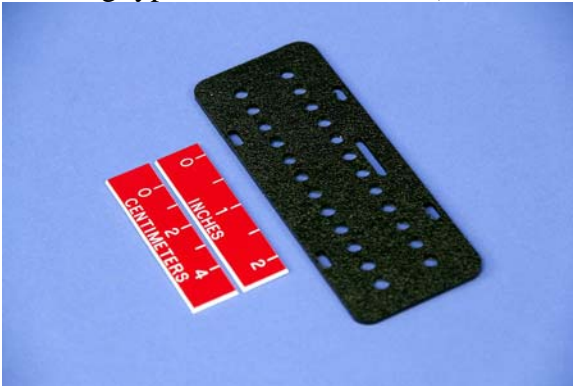
10-string type 84AW or 84PW (Wide mount Aluminum or Polymer)



10-string type 84PN (Narrow mount Polymer)



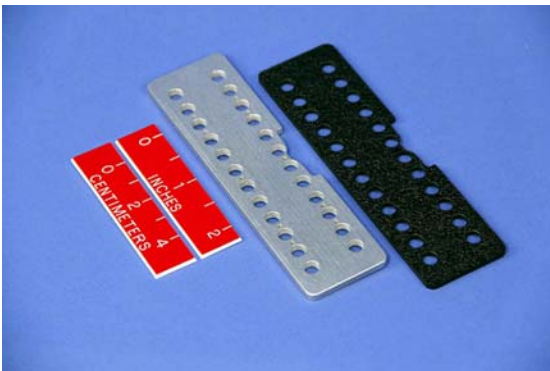
12-string type 128PW & 183PW (Wide mount Polymer)



12-string type 128PN (Narrow Polymer)

---Photo unavailable---

Special Interface Mounts for MSA plug-in pickup carrier



12-string MSA Aluminum & Polymer



12-string MSA Aluminum (shown mounted to MSA phenolic block)

Installation

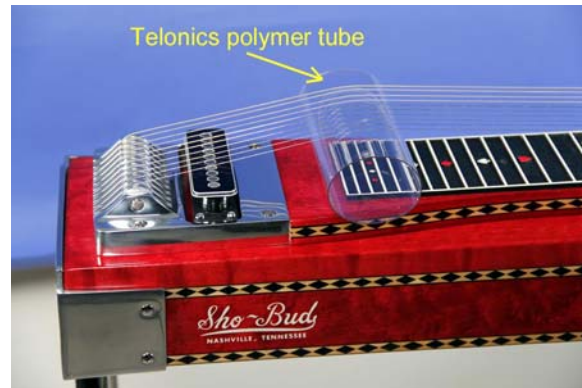
NOTE: Telonics pickups are supplied in polymer tubes which may be used as shown to affect installation without removing the strings. (See cover page photo and photos below - preparing to remove an old single coil pickup)

1. Remove the pickup from its container and examine it. Note the model number label along bottom on one side. **Refer to the specific orientation requirements for that type of pickup – this is critical for single bar designs.**

PHASING NOTE: In order to assure proper phasing *when installing multiple pickups on the same neck*, the pickups **must** be installed with these labels facing the same direction with regard to the neck/end of the steel with the tuning keys.

2. Unsolder or otherwise remove the cable on your old pickup from the switch or terminal block.

3. Loosen the strings until you can slide the tube under the strings near the center of the neck as shown in the photo. Deform the tube slightly if necessary, it will spring back.



4. Carefully move the tube up the neck toward the changer until it is close to the pickup (see photos). If you are concerned about scratching the surface under the tube, place a thin, soft cloth across the neck before sliding the tube under the strings.



5. Remove the old pickup being careful not to lose any mounting screws or tensioning devices such as springs or rubber spaces.

As a suggestion, this would be a good time to discard any old style sponge or rubber tube spacers to convert to good quality springs.

If you have a steel guitar with an adjustable mounting surface such as is used by ZUM, Emmons, Infinity, etc., your Telonics base mount will screw directly into the existing aluminum plate with no changes necessary. Be aware that ZUM guitars with the cabinet drop compensator will prevent the pickup mounting/height adjustment plate from moving down as low as other guitars. Contact the factory regarding alternative mounting techniques.

6. Dress the cable from the new pickup and solder the wires to the switch.

Be sure to connect the black wire and the ground/shield wire together. The red wire is “hot”. Remove the plastic tube and tighten/tune the strings.

Adjustment

Initial Height adjustment

Note: Each pickup is supplied with a 3/32” (0.094”) Allen hex adjustment wrench. Telonics also offers an optional hex tool with an improved handle which is more comfortable and provides higher torque. Initially the adjustment poles will feel very tight. They will loosen a bit with adjustment, however unlike conventional “cut” threads, these threads are formed in a way to prevent them from loosening excessively over time.

First install the pickup and set the height as high as you can without physically contacting the poles with the strings as you play. The closer you run the pickup to the strings, the greater your pick attack sound will be.

For convenience, use coins as gauges by placing them on the highest part of the pickup (adjustable poles, bars, etc). As a general rule, start with a US quarter plus a US dime (a total thickness of 0.120”) under the strings on BOTH ends of the pickup.

It should be noted that other pickup styles which do not offer individual string adjustments are sometimes adjusted slightly upward toward the high strings in order to achieve more treble response. That is generally not necessary with these pickups since they offer a well balanced frequency response. These adjustable Telonics pickups are generally installed approximately level to the plane of the guitar, using the spacing of a quarter plus a dime under the strings on BOTH ends of the pickup.

On pickups designs which do not offer pole screw adjustment, it is a good idea to start with them level. They can be tilted up or down, or from side to side later if special tweaking is desired.

This height adjustment will be adequate for most players, however if you use heavier bar pressure, the clearance can be increased by adding the spacing of an additional “quarter” coin (0.068”) to both ends (a total “gauge” thickness of 0.188”).

Screw Adjustment Pickup Types

(“all” screw adjustment types, and bar pole + screw adjustment types)

*Our pickups with screw adjustment poles push the envelope of what can be done with current technology, but **they don't work properly until they are carefully and correctly adjusted**. The tonal nuances are now getting down to some very fine points and a slight change in amp EQ or in the feed line cable type and length between the guitar and the pedal will change things significantly. These pickups will only work exactly as they were designed when going into either our pedals or our preamps with a very low capacitance cable (it also requires very clean power amps and the best speakers as you know, “**everything matters**”). After the poles are adjusted, it is then necessary to very, very carefully EQ these pickups to get everything possible out of them. As a typical example, when the proper cable and EQ is used with the type 84 (20 pole adjustments), can provide more of a “bell” tone and great balance between the lowest and highest strings.*

The type 34 (single bar with 10 pole adjustments), can provide a BIG low end, as well as cutting highs. But it takes at least an hour or two (and new strings) to adjust them and the EQ for them in order to achieve that tone. The final adjustments to perfect the tone are very small. It's one of those things where to reach the point of sounding really good, a slight tweak in a couple of areas is required, then, you suddenly start to hear the bell-like tonal quality. It only takes a small change to make the magic come or go. After you get the pickup installed correctly, your work is only about 20% done. You will ultimately need to sit in a quiet room and do the best job of adjusting your EQ possible. Then you need to spend at least an hour or two going back and forth from one string to another, striking each string and listening carefully.

As an example, here is the best way we have found to set up the type 84 pickup with two adjustment poles per string. It will take at least thirty minutes to complete pole-balancing procedure properly. *(Unfortunately it is possible that many users will never actually get the sound they should from these pickups just because they either don't know how to do the adjustment, or, won't take the time to do it properly).*

As shipped, the pickups are adjusted with the height of all poles being equal; they are centered in their adjustment range. You can 'try' them set up in this way, but for ultimate performance, you will not want to use them this way. In order for the pickups to work properly, they need to be adjusted to suit your taste. In general, moving **both** the poles for a given string UP OR DOWN **equally** controls the VOLUME of that individual string. UNBALANCING the poles **equally** under a given string controls the tonal CHARACTER of that string. These adjustments must be accomplished/balanced in relationship to the other strings in order for the pickups to work properly.

Again, as you go through the alignment process, keep in mind that moving the pair of adjustment poles up and down **together** (equally) controls the VOLUME of a given string. Moving the two adjustment poles for a given string **unequally** (unbalancing them) affects the tonal quality aspects of that strings - which we will deal with later in this procedure.

DO NOT DO THE FOLLOWING ADJUSTMENTS WITH TIRED EARS. IF YOU DO, YOU WILL PROBABLY FIND THAT YOU WILL HAVE TO DO THEM AGAIN THE NEXT MORNING after your hearing has had a chance to rest. Also, note the relative height of the adjustment screws from the top of the pickup. You may need to return them to this starting height if you accomplish the alignment process incorrectly and have to start over.....

Setting Over-all Pickup Height

First, forget the tone for now. Just adjust the height of the entire pickup (using the 3 or 4 mounting screws, or the 3 or 4 pickup carrier screws - if your steel is so equipped) until the volume of most of the strings is as equal as you can get it - volume only. (Forget the few strings that have an appreciable variation in volume from the others, we'll take care of them later.)

Set your pedal to nominal volume and take your foot off of it and be careful to strike the strings with the same attack and strength every time. **Don't move your volume pedal from now on in this procedure.** Remember that the EQ on your amplifier will have to be pretty flat at this point or it will influence the volume of the lows to the highs and that will make you tilt the pickup wrong mechanically to compensate for it.

Go back and forth, picking the low to high strings until you feel confident that the pickup is mechanically set to give you an average equal volume between the majority of the strings. Now listen very carefully to the volume of each string as they are picked separately. As you know, there are problem strings which are historically louder or weaker than the rest. Pick one of these; say one that is low in volume. Go back and forth between it and the two strings on each side of it until you really get a feel for how much weaker it is. Then, adjust both of the pole screws for that string UP in half turn increments until its volume balances with most of the other strings.

ALWAYS, ALWAYS MOVE BOTH POLES EQUALLY; DO NOT UNBALANCE THEM AT THIS POINT IN THE PROCEDURE. MOVE BOTH POLES EXACTLY THE SAME AMOUNT, in the SAME direction! Keep them even with each other. Treat them as a matched pair for this adjustment.

Repeat this process until all the strings are equal in volume. *(Now, we know that someone else may not hear this the same way you do because of the difference in hearing degradation in experienced musicians, so it should be adjusted for YOUR ears. (We could do these adjustments in the laboratory, but the results on test equipment will not match with your ears, so it must be done this way.)*

Play the steel for a while without using the volume pedal. You may find that you need to touch up a pair of poles a little after playing a few different songs. When you are satisfied that the string volume is as well matched as you can get it, move on to tonal adjustment.

Individual String Tonal Quality

Having completed relative volume adjustment, we are now going to deal with two different aspects of tonal quality. First the tonal equalization (EQ) of the sound, and then those elusive qualities we will just call "X" for lack of a better name. These qualities have literally hundreds of descriptive names and most people will agree that none of these terms actually describe them adequately. Although I would like to go into all of their characteristics, as we say in the scientific journals, "it is beyond the scope of this writing to do justice to the topic". So for our purposes, we will describe the X qualities as incorporating both what some have called "GROWL" on the low strings and "BELLS" and "sizzle" on the high strings. Another more modern word being used is "sibilance". When properly installed on a good, mechanically resonant steel guitar, the type 84 pickup (using two adjustment poles per string), can provide both these qualities with equal balance from low to high frequencies – when properly adjusted and used with a quality volume pedal and amplification equipment.

The Type 84 pickup with dual poles per string, allows the adjustment of these X qualities by intentionally unbalancing the two poles. **BOTH POLES MUST ALWAYS BE MOVED TOGETHER**, in opposite directions, one up, one down. Always move one pole up and the other pole down exactly the same amount when making this "X" adjustment. Most adjustments can be made in 1/2 turn increments or less - once your ear is trained and tuned in. **KEEP TRACK OF YOUR TURNS** so you can get back to where you started if you need to do so.

Now pick a low string that you use often and are "used to hearing" (string 8, 9 or 10 would be typical choices, I like to use 8). Pick it with your thumb slowly and repeatedly and really get used to the sound. Now unbalance the two pole pieces by raising the pole on the changer side ½ turn and lowering the pole under the neck side ½ turn. Pick the string again and listen to the change you have made. When you become experienced, 1/4 or 1/2 turn increments will be enough to hear, but for now as an exercise, you may even want to go another ½ turn on both poles to really hear the difference (one turn total from the original setting on each pole). As you unbalance the two poles in this way, raising the changer-side pole and lowering the neck-side pole, the "X" factor is increased. Conversely, reversing this adjustment would take away some growl on the low strings.

Now go up to a high string, say the third string. Again, unbalance the poles - but in the opposite direction from what we did on the low string. Unbalance the two pole pieces ½ turn each by lowering the pole on the changer side and raising the pole under the neck side. Pick the string again and listen to the change you have made. When you become experienced, 1/4 or 1/2 turn increments will be enough to hear, but for now, you may even want to go another 1/2 turn on both poles to really hear the difference (one turn total each from the original setting). As you unbalance the two poles in this way, raising the neck-side pole and lowering the changer-side pole, you are both tweaking the bell sound and controlling the high-end sizzle (which would otherwise be excessive).

The pattern of adjustment is thus established. The middle string (5) will usually need very little adjustment. As you move progressively downward into the low strings beyond string 5, the changer-side poles will need to be raised progressively more and more (and the neck-side poles must be moved down an equal amount). As you move upward into the high strings, the neck-side poles will need to be progressively raised more and more (and the changer-side poles must be moved down an equal amount).

NOTE: When the adjustment is completed, the height of the poles will be stepped somewhat from one end to the other (in terms of string-pitch), with the changer-side poles being opposite to the neck-side poles. The neck-side poles will generally be highest under the highest treble strings and lowest under the lowest bass strings. The changer-side poles will generally be lowest under the highest frequency treble strings and highest under the lower frequency bass strings.

Note that if you use chromatic strings in your copedent, remember that pole adjustment setting will be "out of order", because the pole height progression necessarily follows string pitch, not string placement.

Upon completion of the pole-balancing alignment, you may find that a string or two may need to be re-adjusted for volume. Just raise or lower both poles the same amount, in the same direction, as necessary, be careful NOT to change their balance relationship.

In the event that you find that all of the upper 5 strings in general, seem to have just a little too much sizzle, you can move the upper end of the pickup down slightly until some of the edge is taken off, then raise the neck-side pole screws under the 5 upper strings ½ to 1 turn more as necessary to bring the lower sounds and attack characteristics back to the same point you had before lowering the end of the pickup.

Now is the time to finally make critical adjustment to the EQ on your amplifier - in light of the changes you have just made to the pickup. The EQ adjustments should be made to enhance the bell-like qualities on the high strings, without dulling or deadening the growl quality on the lower strings. Listen carefully to the attack when picking a high string. It should ring. If it has any form of a dull thud or thunk when you strike it, adjust the blend slightly toward treble, and/or increase treble or reduce bass in that region. It needs to be clean and not muted or deadened. Be sure to use very little bass. Added bass "deadens" the low strings, making them have more of a "thump" when you pick them instead of having "growl" like a barbed-wire fence, or the infamous PP sound.

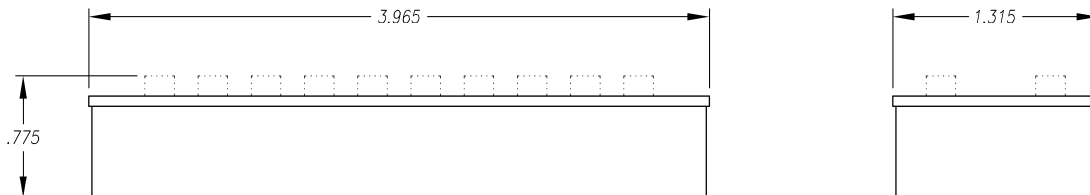
As you play your pickup, you will find that you will gradually refine these adjustments over a time until it all "fits" properly. This may take a few weeks and different playing situations.

That should keep you busy for a while. When you get it right, you won't want to stop playing. AND, it will probably make you play a little bit differently. Once you hear these sounds you are making, you will unconsciously "play into them", enhancing them and incorporating them into your tool kit so that you use them as forms of your expression. People will not know why, they will just say that "you sound better". Many players tell us they are having actual "fun" playing again because their new sound adds life to their playing and their fans hear it too.

Double Bar only Types

Mechanical Outline Dimensions

Outline Dimensions, 10 String Pickups, not including mounting Base



Outline Dimensions, 12 String Pickups, not including mounting Base



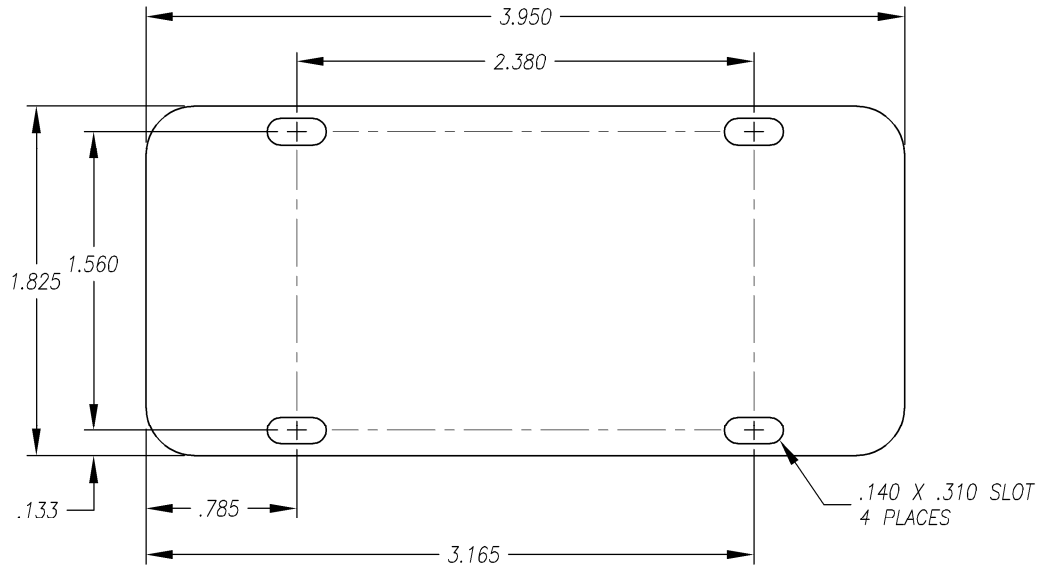
For total height, add the appropriate mounting plate thickness to the 0.775 inch height dimension shown above.

Aluminum mounting plate thickness = 0.125 inches

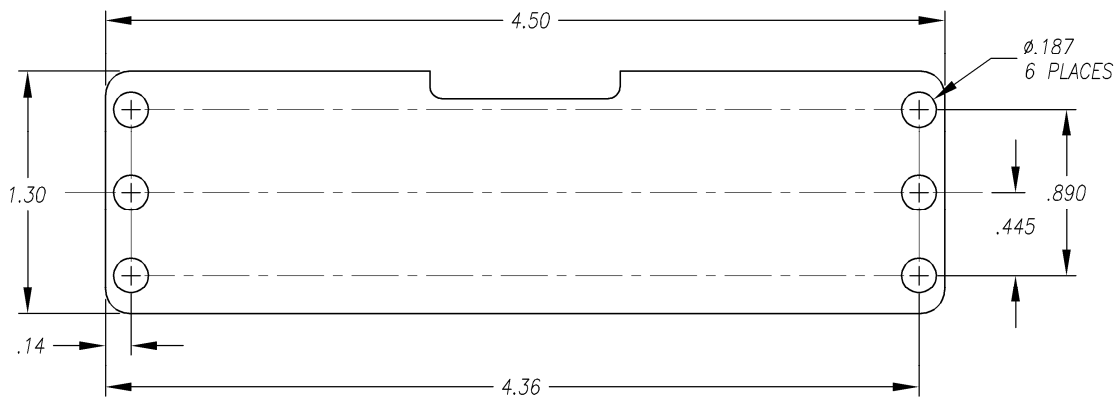
Polymer mounting plate thickness = 0.093 inches

Mounting Plates

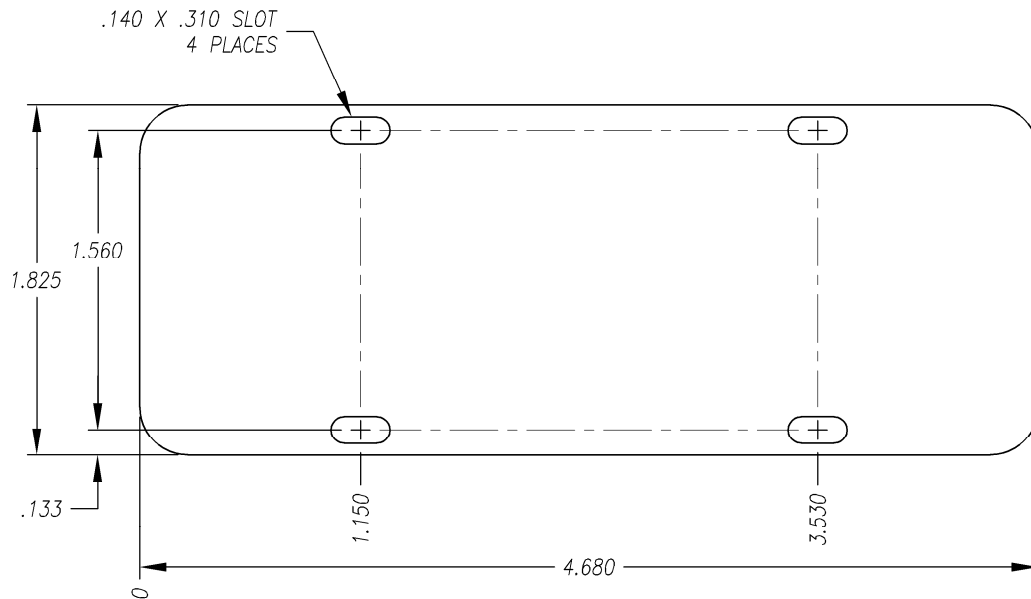
10 string-Wide



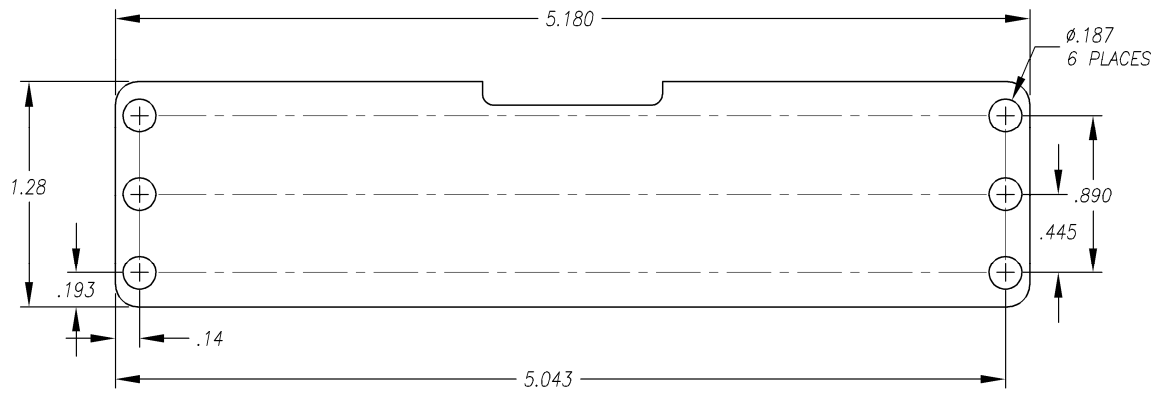
10 String-Narrow



12 string-Wide



12 string-Narrow



---Additional base drawings to be inserted here at a later date---

Equipment Considerations for TPA Pickups (“Everything Matters”)

Cables

For proper performance, cables used must be of high quality premium grade, well shielded (100% is best), with high quality connectors installed and low inherent parallel capacitance (35 pf/foot or less).

We recommend Neutrik and Amphenol connectors with **soldered connections**. Low quality connectors have almost always been confirmed as the cause of intermittent reported hum and noise problems as well as randomly changing volume levels. Low quality ¼ inch plugs are sometimes improperly aligned in the manufacturing process, causing reduced spring pressure against the “ground/earth” contact. We receive many calls where solderless connectors are “the” source of many such headaches. In every reported instance, replacing the offending cable with one using high quality plugs has instantly solved reported problems.

Volume Pedals

TPA pickups are designed for use with high quality, high input impedance “active” volume pedals such as the Telonics FP-100 and related products. The pedals should not provide a load impedance of less than 500K (500,000) ohms. Although they will work to some degree with passive potentiometer pedals, such pedals provide unfavorably low (and varying) load impedance to the pickup. A reduced frequency response will be experienced when plugged directly into such “pot” pedals. However, pot pedals, and in fact, any type of pedal may be used successfully with preamplifiers and amplifiers which offer a pedal SEND and RETURN immediately following the input amplifier – which provides sufficient isolation between the pedal and the direct connection from the guitar/pickup (this is often referred to as a “3-wire” connection set-up).

Preamplifiers and Amplifiers

TPA pickups are designed for use with high quality, high input impedance amplifiers and preamplifiers. As described in the previous paragraph, amplifiers and preamplifiers which offer “pedal loops” for “three-wire” connections to the guitar and pedal are suitable for use with potentiometer “pot” type pedals. The amps and preamps used should provide a quality equalization (“EQ”) system in order to realize the full potential of these pickups. In addition to other conventional controls, this should include a “Presence”- type high frequency control, a MID-Frequency control and a MID-Level control.

Speakers and Speaker Enclosures

The buck stops with the speakers. Period! All of the work which went into the pickups, your guitar, the volume pedals, the preamplifiers and the power amplifiers is completely wasted if the speakers, in combination with their enclosures, are not of the highest possible quality. We recommend JBL K130 speakers, or a combination of a JBL K130 and a JBL D120 speaker. Alternatively, we have had satisfactory results with Peavey 1501-4 Black Widow speakers in a closed-back, front ported enclosure, in combination with a JBL (either a K130 or a K120), in an open-back enclosure. The only powered speakers we have found to provide good results are the TC Furlong SPLIT powered cabinets. The Telonics PRE-1000 Preamplifier is ideal to condition the signal and feed two of TC’s powered cabinets.