



HOW TO GET THE BEST OUT OF YOUR HEADWAY PICKUP SYSTEM

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15) PRO FITTING INSTRUCTIONS

1) CONTROL & EQ

Volume controls (“C”, “X” or T.V.) are useful in matching the output of the instrument to that of another, to vary volume throughout a performance, to allow silent tuning, or to help produce the optimum output to suit an amp or FX unit.

Active Tone Controls (“C”, “X”) offer the ability to fine tune the shape of your own sound to suit instrument, playing style, environment and personal taste. Headway active tone controls compliment the instrument type, offer treble shelving, centre detents and are designed to be immediately to hand.

On the “FEQ” the main equalisation problem has been solved, in the units naturalistic mid cut, which counters steel strung instrument’s tendency to amplify a mid range hump. The FEQ also provides a steeper cut to low end bass boom.

“The Snake” & NYL: Here the only EQ is in a low end roll off to cut body noise, which is applied to all Headway products. *Nylon strings do not normally require a mid cut to be applied, indeed some players prefer a slight mid boost.*

Volume & tone controls (where applicable) boost when turned clock wise, and cut, when turned anti-clockwise. Centre detents on active tone controls, denote a roughly flat response.

When fitted with tone controls on the side of the instrument and the green tested label is facing the inside of the instrument’s top, a person holding the instrument in the normal way, looking at the controls from above, would find the controls (“C” & “X”) aligned as follows:

- i) **treble** - small, upper knob on left pot shaft, with centre detent;
- ii) **bass** - larger, lower knob on left pot shaft, with centre detent;

iii) **vol.** - small, upper knob on right pot shaft, with no detent;

iv) **mid** - larger, lower knob on right pot shaft,
with centre detent

“Snake” + Controls: The **“Snake TV” (Tone & Volume controls)** may be purchased, or with controls added to a standard version. This only offers a passive treble cut and possibly a passive bass cut control, these are similar to controls on electric guitars. See instructions below 26).

2) GUARANTEES

“HE1” and “Snake” pickup and pre-amp units are **not** suitable for splitting for separate use. Any such attempts may cause damage & invalidate the guarantee.

HE1 RANGE GUARANTEE - The **5 Year Guarantee**, applies, to labour (not fitting to instrument), plus all parts, for the original owner, except pots, knobs and end pin jacks. since while these are high specification components, their life is dependent, primarily, upon factors beyond Headway’s control, such as care in use and fitting. **A Six Month Guarantee** will apply to these other parts. Always retain proof of purchase.

Guarantees are validated by completing & returning the card. The removal of the SER No., or attempts to open the pre-amp, damaging its tamper evident label, will indemnify Guarantees. **Products returned, must be sent pre-paid.**

The Snake” Guarantee - As above, but read “12 Months” instead of “5 Years”.

3) **FITTING EXPERIENCE?** While the “HE1” & “Snake” may be purchased as a means of improving on your current pickup system, where existing under saddle pickups or pre-amps have been in place, any modifications to the instrument that may be necessary would be a skilled job and **SHOULD ONLY BE CARRIED OUT BY AN EXPERIENCED LUTHIER OR INSTRUMENT MAKER / REPAIRER.** Headway Electronics will NOT be held responsible for damage caused to instrument or “HE” System through attempted DIY, or unqualified fitting of the system.

If in doubt, **contact your local luthier or Guitar workshop, via Yellow Pages, the local/music press, or Headway.**

However, it is not necessary to drill the sides of your instrument for controls to the **“C” Pre-amp**, since that entire unit can be fitted inside the body, on a simple bracket. This might be roughly “U” shaped, with pre-amp held in place on pot bushes, fixing to top block and with controls pointed towards soundhole, allowing pre-setting of controls.

4) **QUIET PLUG IN:** The “HE” Series incorporates an FET switching system, reducing the amplified clunk, when plugging in and out of the device.

While it is impossible to eliminate all plug in noise by these means, it will be most effective if you **plug into and out of the socket, in one sharp move.** “The Snake” P/U’s modest clunk is also minimised with a sharp plug in action. The noise can be virtually eliminated, by Switchcraft quiet switching jack plugs, connected to Pre-amp outputs (not external pre-amp inputs), or by channel muting.

5) **BATTERY REQUIREMENTS** - Headway recommends using an Alkali or **Lithium PP3 / 6F22** battery, from a reputable source, in native text, noting “use by” time. Keep a spare and based roughly on limited weekend use for:

i) HE1 Range - change an Alkali at least once a year.

ii) “Snake” - change an Alkali battery at least every 18 Months

iii) Where regular multiple weekly use is made change alkali battery every 3-6 months

The Lithium should last 2-3 times longer. **Reduced treble/output, offers a warning of low battery power. Monitor for leaks!**

Headway battery terminals are non reversible to prevent reverse polarity non-functioning/damage.

UNPLUG WHEN NOT IN USE TO SAVE BATTERY LIFE!

6) **CABLES & CONNECTORS** - Your weakest points, in the long chain of devices to the speakers, are invariably leads & connectors, particularly the jack (guitar) lead, so for best results, Headway recommends that you use **low noise, single core, flexible, screened cable, of up to around 33 feet (10 Metres) on the output from the pre-amp.** Alternatively, the use of DTI / Government Approved Radio Transmitters is effective. **USE ONLY WESTERN DESIGNED METAL JACK PLUGS, i.e., Switchcraft, Neutrik, Deltron, Horizon or Rendar/Schurter.**

7) **CHANGING STRINGS** When re-stringing, where under saddle pickups are fitted, you are advised to **change strings one at a time**, to minimise the possibility of disturbing the balance. However, the removal of all strings should not normally be a problem where pickup has been fully bedded in with saddle.

8) **BEST SOUNDS** You are advised to use a full range PA (3 way speakers with dedicated mid) possibly alongside a decent acoustic (backline) guitar combo. **PIEZO CERAMIC TWEETERS/HORNS ARE GENERALLY BEST AVOIDED.** A little digital reverb should help provide best results for most situations.

Body boom can be further cut by **cutting below 80 Hz** for acoustic guitar bottom "E" or 70 Hz, where a dropped bottom "D" string has been employed. If you wish to cut treble via a graphic Equaliser, we suggest first trying around **2-4 kHz.**

On Mandolin - Cut below 200 Hz

Celtic Bouzouki/ Octave Mandola (GDAE) – Cut below 100 Hz

Acoustic Bass Guitar (4 string) – Cut below 40 Hz

Acoustic Bass Guitar (5 string) – Cut below 30 Hz.

On "**The Snake1**" or HE1/G1.NYL, we suggest **backing off a mid control** for steel strung instruments, or the popular smile shaped graphic equaliser.

Snake2 – Incorporates higher output, lower pre-amp mass and a modest fixed Mid cut for steel strung acoustic guitar. However, this modest mid cut is also preferred by some nylon strung players.

9) MINIMISE FEEDBACK at very high volume levels, particularly where stage monitors are used, by inserting **soundhole plug** into sound hole. They offer the potential of 3-5dB additional level before feedback and are particularly useful for the relatively problematic Acoustic Bass Guitar. Beyond that we recommend Behringer Feedback Destroyer Rack Units, or notch filters.

Sound hole plugs may be constructed by using rubber adhesive to stick together 3 layers of mouse mat material, where the two outer layers are larger than sound hole but the inner is slightly smaller.

Also, keep instrument and mikes well behind speakers, or try re-angling speakers /monitors;

Make use of damping material in room, such as closing curtains.

10) STORAGE ADVICE - Headway suggests a foam lined hard case, such as the "**Hiscox**" to lower the risk of damage to instrument or pickup by storage at extreme temperatures, e.g car boots, in continuous direct sunshine.

11) LIABILITY - While such damage is unlikely, Headway Electronics cannot be held responsible for damage caused by leaking batteries, the subjection of its products to unreasonably high or low temperatures, the use of its pre-amps with other pick-ups, or abuse of its products, or any musical instrument during fitting.

Headway will not be responsible for consequential loss or damages, or damage due to misuse, accident or neglect. Headway Electronics retains the right to make such determination on its own inspection.

Since Headway pickup products are powered solely by battery and operate entirely independently of mains based power sources, **Headway Electronics cannot be held responsible for injuries or damage caused by electric shocks.**

12) PROBLEM PREVENTION:-

i) refrain from using mains gear immediately, when even minor shocks are detected and seek pro advice,

ii) have mains gear serviced regularly by professionals (**see EU / Govt. Regs**);

iii) avoid venues with suspect or damp wiring;

iv) route mains leads via regularly tested 'Residual Current Circuit Breakers' (**RCBs**) and **surge filters**;

v) where mikes are used, try to use DTI/ Government approved radio microphones;

vi) **On External "X" Series Systems:** (e.g **HE1/G1 "X"**) ensure that only good condition, high screen quality leads are used from instrument to external pre-amp (**max.: 20' / 6.1m**) and the shorter the better!

13) TROUBLE-SHOOTER CHECKLIST

i) Uneven string amplification, harsh or boomy sound - Pickup is usually not fitted/seated correctly or evenly, Seeing under Pro fitting instructions for techniques above to check problem & correct;

ii) intermittent or no signal - (a) check battery snaps are fully pushed home and pinched on tight via female connectors on both terminals;

(b) check that jack plug is fully pushed home, socket terminals are not distorted and socket body is not too far sunk into end block to allow jack plug from reaching internal contacts,

(c) check that plug is not out of spec. & too long for socket by pulling out slightly, as far east plugs are often too inconsistent, featuring various lengths & tip profiles. If this works, change jack plugs, or loosen hidden external inner hexagonal socket nut, at point where when fully tightened, visible end pin nut must slightly restrict entry of jack plug, in order to attempt proper terminal contact;

(d) avoid all jack plugs except Switchcraft (USA), Horizon (USA), Neutrik (Aus), Schurter/Rendar (UK) & Deltron (UK)

iii) weak, dull or distorted sound - change PP3 Battery for new Alkali or Lithium unit, / **avoiding Zinc Carbon/Heavy Duty or rechargeable PP3's** or batteries leaking, or those reading less than 8 Volts, (particularly when under electronic load) ;

iv) interference on PA or Combo, such as hum -

(a) check that any tail piece is earthed to jack socket;

(b) change instrument/Guitar jack lead, or check /re-solder earth connections;

(c) change signal routing to avoid earth loops or try earth lift switch;

(d) use mains filter on all mains inputs;

(e) access mains via different ring main from that of lighting;

(f) turn off other electrical/electronic devices.

If problems persist, contact your dealer or Headway.

IMPROVE-ISATION: Headway Electronics operates a policy of continuous improvement and reserves the right to alter specifications without notice.

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14) SYSTEMS PLANNED:

- Shire King Acoustic Guitar combo amps;
- Sheer Acoustic SA1 Slider 4 band EQ Pre-amp systems for acoustic Guitar;
- Systems for Violin, Cello, Double Bass, Banjo Limpet and stock raiseable bridge pickups for Guitar and Mandolin;
- External belt mount or floor battery boxes as stock items;
- Active Magnetic Sound Hole Pickup for Acoustic Guitar;
- Low impedance or mid boost Circuits for Electric Guitar, plus Electric Bass Guitar;
- Newly refined active contact pickups for Guitars

15) HEADWAY PRODUCTS AVAILABLE

HE1 Range & The Snake - Specialist Active Under Saddle Pickup systems tailored for:

Acoustic Guitar, Nylon Strung Guitar, Acoustic Bass Guitar, Mandolin, Bouzouki, Dobro, National Steel & Harp.

Options include:

On Board Controls, Fixed EQ/No Controls, External/Belt Mount Controls.

“Limpet” Range - Easy fit range of 20mm Diameter low profile, high quality Ceramic Disc Contact Pickups. Features Pickup screening, superior flexible co-axial cable, sturdy epoxy construction, damping/insulating layer and hardwood filter baffle to minimise boom and feedback. Suitable for permanent internal or temporary external fitting. Available singly or:

“Limpet Dual “ - Twin P/U’s wired in parallel to broaden sensing area and enrich sound;

“Limpet Plus” - with Active Class “A” All Discrete component pre-amp for Low Impedance for consistent sound and performance across various cables, amps and other devices. Also delivers smoother response and harmonically enriched Headway tone.

“Limpet Drum” & “Limpet Drum Plus” - Unique Open Percussion Pickups (Bodhran/Tabor/African etc.), easy fit rosewood housed Pickup Assembly, minimises feedback, moderates excessive rimshots and allows variations in tone, via adjustable thumb bolt pressure.

“*The Band*” - Revolutionary strap around body Violin Pickup, requires no modifications, no fitting charges, and no Pre-amp in vicinity of Instrument. Realistic sound, good feedback rejection, strong passive signal.

VL3 – Revolutionary, superior Active Bridge based acoustic Violin pickup system comprising quality European Teller Bridge with integral multi element pickup within lower part of bridge, European Clamp Jack Socket with polished Rosewood, Cork and Nickel components, high screen custom length jack lead, belt mount Class “A” pre-amp tuned around Violin Frequencies, with Violin specific 3 band interactive EQ & Volume Controls and quick change battery access.

Incredibly natural tone, no excess treble or body handling noise, minimised bowing noise, astonishing rejection of feedback and noise.

VL1 – Simplified version of VL3 for acoustic Violin, with basic level Class “A” pre-amp, inside jack socket clamping on board instrument, plus belt mount battery holder, powering via Stereo high screen jack lead supplied. Extremely high level of quality, trouble free performance, at greatly lower price.

Validate your guarantee by sending back the card enclosed with product. Or find out more about Headway products from:

Headway Electronics PTNRS, Home Fm Wks, Clifton Rd., Deddington, Nr. Banbury, Oxfordshire. OX15 0TP. UK. www.headwayelectronics.com sales@headwayelectronics.com / tech@headwayelectronics.com

15) PROFESSIONAL FITTING INSTRUCTIONS:

HE1 Range & “Snake”

- 1) Saddle Notes
- 2) Saddle & Slot Routing
- 3) Saddle Material
- 4) Dummy Saddle Testing
- 5) Saddle Fitting Aim
- 6) Assess Saddle Flatness
- 7) Saddle Bedding Down
- 8) String Biasing
- 9) String Balance Improvements
- 10) National & Dobro P/U Fitting
- 11) Harp, Hammer Dulcimer & Ud P/U Fitting
- 12) Pickup Don't Do's
- 13) Piezo Principles
- 14) Pickup Entering Slot
- 15) Pickup routing - Moveable Bridges
- 16) Custom Pickups
- 17) Controls Fitting On Board
 - through sides
 - non intrusive pre-setting
- 18) Drilling Template for Controls

- 19) Battery Unit Fitting
 - HE1
 - Snake
 - External Pre-amp Notes
- 20) Custom Battery Fitting
 - “f” hole & National
- 21) External Battery Box
- 22) Jack Socket Fitting
 - 2 piece end pin
 - 1 piece end pin
 - Panel sockets
 - Non-intrusive line socket
- 23) Re-Wiring Jack Sockets
- 24) Wire Location

- 25) Multi Pickup Fitting

- Custom Wiring
 - "Y" lead construction
- 26) Custom Controls Additions
 - 27) Earthing Notes
 - 28) Problem Checklist Referral
 - 29) FEQ Notes
 - 30) External "X" System notes
 - 31) Guitar & Mandolin Adjustable Bridge P/U Fitting

1) SADDLE NOTES - With its rounded profile, the HE1 & "Snake" Pickup is less likely to suffer imbalances from staggering the saddle for intonation. In addition, there is less likelihood of imbalances from saddle twisting, than with flat P/U's.

2) SADDLE & SLOT ROUTING can be performed using the Luthiers Mercantile International Inc "Bridge Saddle Routing Jig" (SPBSRJ) combined with the Precision Miniature Router Base (SPPMR) which accommodates compact Routers, either the **recommended "Black & Decker Wizzard"** TM, or the Dremel Multi-Pro (formally Moto-Tool).

Alternatively, you may use the Guitar Systems Vacu-jig or Stuart-Macdonald Bridge Saddle Routing Jig, combined with a compact Router.

Flat or round base? The bridge base slot may be machined half round (concave), to close engineering tolerances, by the preferred, horizontal milling, using a fine, solid Carbide 2.5mm ball end cutter /milling bit, or a fractionally smaller Imperial version. Alternatively, it may be milled flat. Opinions vary as to whether flat or half round routing achieves faster, simpler string balances or slight differences in tone. It is far less importance than accuracy.

When using the compact routing machines, cleaner routing is obtained when the depth is taken out, a little at a time.

The strings should NOT go closer than 4mm (0.16") from the tip of the pickup. If possible, when building an instrument, allow a longer distance (1cm) either side of string courses. This will more easily help achieve string balances.

Chamfering saddle base edges: This helps smooth the up and down movements that are needed to drive the pickup effectively. This principle can be extended to fine **slot edge routing**, through a tiny edge rout, to get rid of taggy edges and corners. However this work may be useless, unless saddle is snugly upright and not jammed in, under string pressure.

3) SADDLE MATERIAL - The saddle material should be the favoured bone, Ivory, Tusq, or Micarta. However, while synthetic material is sometimes regarded as slightly more consistent than bone for string balances on U/ Saddle pickups, we prefer bone.

HEADWAY DO NOT RECOMMEND COREAN (BECAUSE OF ITS SOFT, FLEXIBLE NATURE), BRASS, OR NON-SPECIFIC PLASTICS.

Beef shin bone is a favourite for its density, although veined parts of bone should be avoided.

Headway reminds you that **ivory should only be purchased where sold through legitimate routes, antique or fossilised**, in view of the threat to endangered Wildlife from Poachers.

4) DUMMY SADDLE TESTING - The correct saddle height may be found by testing the strung up action with an unfitted piece of dummy saddle material, before replicating its height for the correct action, with the actual saddle itself. This helps to ensure that you do not take too much material from the bottom of the actual saddle. A fine file, or block with "Wet & Dry" may suffice.

5) IMPORTANT SADDLE FITTING AIM: The saddle should be tight enough to remain upright and avoid being tilted under string pressure, but snug and just loose enough to fall out by its own weight.

6) ASSESS SADDLE FLATNESS - As a means for assessing the flatness of a saddle, you may rub a graphite pencil evenly onto an absolutely flat, rigid surface (e.g a steel, float glass or good mirror), and while holding the saddle in the middle, run the part over it a few times to see where graphite is deposited,

denoting where contact is being made. This may be repeated, by wiping the saddle and holding different ends of the saddle to get a wider picture.

A less accurate alternative would be to hold the saddle up to light with saddle base along metal set square edge and see where light comes in between, to denote low contact area.

The most common error on non-machined seating, is to have eroded more off the saddle underside from one or both ends, than in the middle. This increases the likelihood of finding a poor response on top and/or bottom strings, through poor contact /pressure.

7) SADDLE BEDDING DOWN - The under saddle pickup may need to bed down into any new saddle/pickup/ bridge arrangement, over a 1-4 day period. If necessary, this can be short cut by the more drastic action in **8 iii)**. If there continues to be a problem, you may re-attempt to achieve a flatter seating of the saddle and slot base areas, a round routed slot base, or use a minimum amount of tape, preferably fine adhesive **metal tape, layered along the bottom of saddle parts, as a shim**. This may compensate for any slight gaps as a result of inadequate seating, or string pressure imbalances, but should not normally require more than 2-3 layers. Avoid tape protruding out of side of saddle.

While metal tape can be a quick fix for U/S balance problems, and does not usually affect the instrument's audible acoustic tone or response, it can slightly reduce the pickup output **You may check for unwanted gaps by careful pressing of each end of the saddle, with the instrument amplified at low levels, listening for unwanted clunks.**

The process of pressing down the saddle repeatedly over time, may assist seating, if there are not fundamental inaccuracies.

8) STRING BIASING - As an alternative to tape, a curved saddle underside (a slightly banana shaped profile?) can be used to bias certain strings with additional pressure. **Flat slot routing produces excellent results, 2.4- 2.5 mm diam.**, while some makers prefer half round routing. Headway can supply the correct ball end, 2 Flute Carbide ball end cutter bit, suitable for compact routers and half round routing. Or via J&L Industrial Supply in US / UK Tel: 0044-(0) 800 66 33 55 / Fax: 0044-(0) - 5800 58. Part no: MCB40318D.)

9) STRING BALANCE IMPROVEMENTS - i) A further method used to attempt improved string balances, is by cutting fine, deep notches on the underside of the saddle, midway between where each of the strings pass over the saddle. If the instrument has double courses (i.e. 12 Strings), do NOT cut notches in between the strings in each pair/course. Instead, cut between course pairs.

This allows flex under string pressure, which may improve string balances, but it is not the panacea sometimes assumed and can make matters less balanced.

i) **SMALL IMPROVEMENT VIA GRAPHITE PENCIL:** This pencil graphite or "lead", can act as lubricant, marginally assisting, from hidden lower sides of saddle, to smooth the tiny saddle movements, as a result of strings tensioned from playing.

ii) **AVOID: Moulded saddle with flexible legs:** We do NOT like this saddle from a major U.S. Pickup maker, because of the uneven, unstable legs, which move around, when you try to sand them.

iii) **CAUTION! DRASTIC SEATING METHODS:** Finally, a method of achieving better pickup seating which is not openly reported but is commonly used, is to put a rounded concave tip profile on a long narrow piece of scrap hardwood or Dowel, which is then placed against string balance weak spot(s) on the strung up saddle and struck firmly with a light hammer. While we have never heard of any problems resulting from this method, we urge caution, as excessive force could cause a problem, especially on lightly built, or structurally flawed instruments.

iv) **Clamping up Guitar overnight,** carefully with pressure applied between back and saddle, often seats the pickup correctly.

v) **REVERSING PICKUP ENTRY END** – This may help where there is an imbalance, especially from the top or bottom string, by plugging and re-drilling entry hole at other end, as shallow an angle as is feasible.

HOWEVER, THERE ARE NO QUICK FIXES FOR FITTING ANY UNDER SADDLE PICKUP THAT JUSTIFY IGNORING GOOD PRACTICES & ACCURATE TOLERANCES.

10) NATIONAL RESOPHONIC, DOBRO PICKUP FITTING NOTES - i) National's pickups are best fitted with the piezo cable pickup placed in a **semi-circular routed slot arrangement**, allowing the pickup to be laid **close to and parallel to the round edge of the wooden Biscuit**. The pickup should protrude fractionally from it's slot, sufficient to place pressure onto it, between the Biscuit and the resonator cone. See Battery powering notes 19) & 20).

ii) **Dobros** may be fitted with single, standard length pickups which can made to bend around the centre saddle screw, with the pickup under indirect string pressure either side of the screw. Alternatively, non-standard twin pickups may be ordered to place **separate pickups, either side of the screw**. See 16).

11) HARP, HAMMER DULCIMER & UD (OUD)- CUSTOM PICKUP FITTING NOTES: Please note that the notes below supplement the general fitting and "how to get the best..." principles. See Custom P/U fitting 16).

i) **Harp pickups** are best laid alongside the entire length of the sound board (approximately 0.5m-1.4m), but under indirect, even string pressure via a hardwood tongue or free strut routed for the 2.5mm diameter pickup slot, where the string ends are fastened to this tensioned free strut. The Harp benefits from more pre-amp gain than may be possible via an adapted Snake P/U, therefore a modified version of the HE1 range pre-amps will be required, in any format, i.e. "C" with on board controls, FEQ Fixed EQ/No controls (Steel strung), NYL/No controls (Nylon Strung), or "X". Alternatively, custom parallel wired numbers of the "Limpet" contact disc pickups may be retro fitted.

ii) **HAMMER DULCIMER** pickups (2 wired in parallel to one pre-amp) are best fitted along the entire length of both bridges, preferably where continuous bridges are used rather than individual Chessmen. In this latter case, we could not be certain that an acceptable or consistent string balance could be achieved. Alternatively, custom parallel wired numbers of the "Limpet" contact disc pickups may be retro fitted.

iii) **Ud (Oud)/ Lute** Pickups can get excellent results using a custom length version of "The Snake" with external exposure of all components. The Nylon strings go directly over the plastic covered steel braid of the Pickup, which usually sits in a shallow slant angled slot in the bridge, the positioning of which is chosen according to where there is the most even and heavy string wrap pressure. See 22) Non-intrusive jack socket mounting notes.

12) PICKUP DON'T DO'S – These actions would negate guarantee

- i) Do NOT use abrasives on "HE1" pickup;
- ii) Do NOT crush, pull on, jam up, or kink the pickup or wire & **do not bend the black joint**;
- iii) Do NOT remove or knot the cable from the pickup.
- (iv) Do not use water based adhesives on HE1 Pickup.
- (v) Do NOT cut piezo cable pickups without referring to Headway, on suitability of spec., or method.

13) PIEZO PRINCIPLES: The Piezo cable pickup works far better when installed under high, but even pressure from strings (normally indirectly pressured) and free to minuscule movement, i.e. not glued in.

14) PICKUP ENTERING SLOT - Single pickups should be inserted from the underside of the bridge, through a 2.5 mm + (0.098" +) hole, drilled at up to around 50 degrees (the shallower the better!), to the plane of the saddle slot. The hole is often better placed on the treble end of the saddle.

You may bend the pickup, although excessively steep bending, plus forceful insertion of saddle, may cause the clear outer to split, compromising it's protective aspect very slightly and making It less easily transferable.

The pickup hole is better NOT drilled through a strut. If this cannot be avoided, take care NOT to split the strut by drilling gently, using a hand drill.

Excessive pickup length can be taped to the inside of the instrument's top to avoid excessive wagging. This could add a worthwhile element to the tone.

15) PICKUP SLOT ROUTING ON MOVEABLE BRIDGES, the pickup and its wire can be routed through a hole in the top of the instrument, or through a hole in the side of the bridge, in order to run the wire through the sound hole, under a raised scratch plate (arch top), or along a tail piece. This method avoids the need to drill the top of the instrument, but take care to anchor exposed wires against accidental tugging or abrasion.

It may also be possible to bury the black pickup joint, in a **moveable bridge**, by countersinking a hole of approximately 4mm (0.15"), in the base of the bridge.

Where a hole is to be drilled through the top of the instrument for a moveable bridge, mark out carefully where this hole is to line up with the hole in the underside of the bridge, on the treble end. *After* determining accurate intonation position, then allow for movement, intonation and any slight inaccuracies, by making the hole in the top of at least 4mm (0.16") in diameter. Whatever people may *think* of this hole, we do not hear of problems as a result. See notes on P/U's fitted to raisable bridges 31).

16) CUSTOM PICKUPS: Twin Pickups are available to order at any length, or for split saddles, Dobros or bridge saddle and top nut pairings, to assist tapping styles. Two pickups on separate cables may be wired in parallel into the same pre-amp and will work electronically, as if they were one.

When deciding a pickup length, use string to simulate the length of pickup area plus the additional length required for the bend into the instrument, before the thicker joint.

17) CONTROLS FITTING ON BOARD - e.g. HE1/G1.C (Not "X" models):

i) through the instrument's body sides, as follows:

Mark out the insertion points for the controls, **checking that there is enough clearance inside the instrument's body to allow room for the pre-amp (54x25 mm) on shallow bodied instruments**, with the positioning of the controls, as required. Then using a Brad Pointed Drill (7 mm / 0.28" diam.), make an insertion on the side of the instrument, half way between the two edges of the instrument, along a line parallel to those edges, where the insertion points (mid points) of the holes are **1.2" (3.04cm) apart. This standard, circuit track related dimension, is not at all likely to change, and allows the "HE1" Series Pre-Amps, to more easily replace other units, where applicable.**

Alternatively, you may open up the hole in the sides, by a series of drills, increasing gradually, from very fine, preferably opening out the final stage by reaming/ rasping. **A tapered reamer is usually safest.** (See Luthier Supplies outfits).

If mounted as above, the green tested label should be facing the inside of the instrument's top.

IN LINE MOUNTING: As an alternative to side by side mounting, the two pots can be mounted in line (e.g. shallow bodied instruments with less than 54mm available depth between ribs). Check that the sweep of the pots here, is left (off) to right (full on), with the centre detent tone positions set towards the instrument top. Also check knobs are aligned correctly, as above.

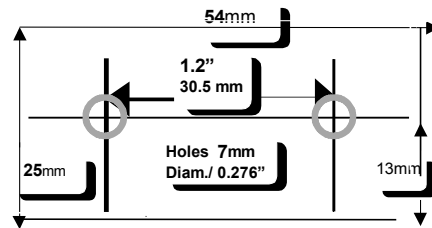
A template is provided with product to assist you in fitting controls (where applicable). which may be cut out off the page and placed against the instrument, to help check that the linings are kept clear. **See below.**

The unit may be bolted through the holes made, using the bush threads, with nuts & rubber shock washers provided, then lining up the knobs to match the radius of sweep of the controls and intended operational facing, before carefully easing them on.

ii) NON-INTRUSIVE CONTROLS FITTING - PRE-SETTING

As an alternative to controls through the body sides, controls may be mounted on a roughly off centred, wide "U" shaped metal plate bracket, which screws to top block, allowing controls to be accessed and pre-set via sound hole.

18) DRILLING TEMPLATE FOR "C" - On Body Controls Mounting Option. N.B. See 17:



19) BATTERY UNIT OR BAG FITTING - i) HE1: For on board models this can be attached to the inside of the body by the large strip of adhesive velcro. As an alternative, the units can be attached by double sided sticky tape, wood glue, or size 4 Posidrive, countersunk screws supplied, for unit, or velcro base plate.

20) Affix adhesive Velcro only to clean, dry non greasy surfaces. Surfaces may be cleaned by affixing and tearing off sticky tapes from the area. Velcro method provides easier battery access, by lifting battery holder out.

ii) Snake's battery attachments - The metal clip should be screwed to the top block with screws provided, or screwed to a piece of wood, which can be glued or velcro'd to the top block. Alternatively, double sided tape may be used to hold the clip in place while wielding the screwdriver, preferably an electric model. **Battery bag & velcro option, are now available.**

iii) For the **External "X" Pre- amps**, the PP3 (6F22) battery is mounted in the black side compartment drawer, a black sliding cover, or via a coin operated centre screw, into the box, with a non-reversible battery terminal on a flying lead.

Headway Battery cable is standard colour coded cable: **red = positive / black = negative**. The terminal to "The Snake" and new HE1 range is non-reversible on a flying lead.

20) CUSTOM BATTERY FITTING -e.g. "f" HOLE/ NATIONAL STEEL : "f" hole/small round hole and Resophonic cone instruments may be accommodated in terms of powering by using an **EXTERNAL LOADING, QUICK CHANGE, PULL DRAWER BATTERY HOLDER**, such as the Bulgin (UK), which we can offer. This requires solder fitting. Alternatively, far east made PP3 holders are available which allow flying lead terminal to be pushed through side of external holder, without additional soldering.

Any fitting that may be subject to restricted access may be achieved by using a pull through arrangement. In addition, if a through the side, pull drawer battery holder was used, **THE RECTANGULAR BATTERY HOLE CREATED MAY BE USEFUL FOR ADDITIONAL ACCESS DURING FITTING. See 22) Non-intrusive fitting of jack sockets.**

Our most popular means of amplifying restricted access instruments is to use an HE1 passive P/U on board the Guitar, with no On Board Battery or pre-amp, as part of the HE1/G1.X system, which offers a belt mount pre-amp. Alternatively, an external battery box can offer a less expensive method.

21) EXTERNAL BATTERY BOX: External powering of an on board pre-amp can be achieved by rigging up a simple external battery box with a mono output to PA and a Stereo input from Guitar. The stereo lead from Guitar, allows the boxed PP3 to power the Guitar pre-amp via 1 leg of the Stereo lead (normally the ring - blue). The box may be belt, or floor mounted & need not be screened. Headway can offer these.

SNAKE EXTERNAL POWERING FROM STEREO LEAD: First short out unused on board terminals by connecting them together, possibly by folding across middle of soft terminals, then connect positive battery

terminal in external box to ring (blue lead) on jack in, and connect battery negative to earth on jack in socket. This method cannot easily be achieved by HE1 systems, which would have to be ordered.

22) JACK FITTING - i) 2 piece end pin jacks, supplied as standard, are solder connected for ease of installation. These should normally be fitted in the rear block, or end block of the instrument and can replace the end strap button in its normal position, on the sides, behind the bridge. It can be fitted, by masking off the area and drilling a small diameter exploratory hole, checking that it lines up, at a perfect right angle. This can then be drilled out with a larger drill.

The end pin hole should finally be reamed/rasped for the Switchcraft socket diam. of **15/32"** (11.9 mm). A 1/2" (1.27mm) reamer is ideal for this job. Alternatively, use a Brad Pointed Drill. The jack should be inserted into the inside of the body of the instrument with the large jack hex nut & lock washer arranged as necessary, to allow only the smaller threaded section to protrude from the end pin hole.

The distance between the hex nut and end pin is found by marking & measuring a rod, inserted into the hole.

FITTING WITH RESTRICTED ACCESS: If there is a problem in getting a hand inside an instrument, thread a fine cord through the end pin hole and out through the sound hole. The end of the cord is then tied to the small hole on the narrow diameter part of the end pin jack, which is then pulled into place through the sound hole in the instrument. Use a rod through the jack socket hole, while you screw on the washer/hex nut & end pin button, from outside.

If this small additional fitting hole is not in place, a pull through may be achieved by using a special jack plug, which has had it's metal body turned/ground down to less than 15/32" (11.9mm)

Ensure that the fit is tight and that the external thread is fully home, otherwise adjustments will have to be made to the nut, inside of the instrument.

Take care not to allow the wires inside the instrument to get twisted or to rattle.

ii) **one piece end pin jacks** are used, these can be inserted from outside the instrument, but must be soldered to the cable, while it is protruding from the end pin hole. If there is a problem in tightening the hex nut inside, the socket can be held in place with wood glue/friction. You may also wish to super glue the external hex nut to the thread, before placing the unit in the end block, with external washer to the body.

Several varieties of 1 piece E.P. Jack sockets offer a half turn, 5.5 turns, or 12 turns (clockwise). To compensate for this, allow the attached unit to freely turn an equal number of turns in the same direction.

Alternatively, where the pickup is already fixed, twist the connecting cable itself, by the a compensating number of anti-clockwise turns then twist insert end pin jack clockwise.

iii) **PANEL JACK SOCKETS:** Alternatively, simple jack sockets can be fitted to the side of the instrument, instead of using end pin arrangements. However, an external mounting plate, metal washer and/ or internal wooden block must be used. The Plates can be found in Guitar/Electronics suppliers.

iv) **NON-INTRUSIVE SOCKET MOUNTING** - An in line, or end pin jack socket may be fitted to the side of the instrument, or under a raised scratch plate (arch top) without drilling by the use of around 4 black nylon **re-useable cable ties with matching tie bases carrying permanent adhesive foam pads**, available from Headway or electronics retailers. The area of adhesion should be cleaned free of grease or dust. For this arrangement we recommend that insertion or removal of the jack plug is supported by holding onto the socket. Alternatively, a mounting bracket could be made, fitting to end pin jack as a sturdy bolt on steel washer.

23) RE-WIRING JACKS SOCKETS - On certain sockets, the tip contact has a smaller wire hole. If in doubt, check inside socket body. The tip contact will be furthest inside.

Put covers, grommets, shrinks & strain relief over cable, twist up wires and tin all contacts points *before soldering*. When changing a socket, *label or carefully note the contacts before removal*, to help in replacing them.

See FEQ notes below (29), for changing end pin jacks.

To wire a stereo socket - Active On Board Units ("Snake" & HE1 / not "X") - solder connect the red insulated signal wire to the tip, blue wire to the ring and non-insulated earth wire to the larger earth terminal.

Non-active/passive socket wiring (e.g. "HE1 Passive" as part of "X" system) - Solder connect the red signal wire to the tip and the non-insulated earth wire to the earth connector. Mono, Stereo or 4 pole sockets are suitable.

24) WIRE LOCATION: Wires should normally be attached to the least resonant parts of the inside of the body, such as blocks, struts, ribs, or back/sides, by the small remaining strips of velcro provided (HE1 Range only). **In order to seat velcro properly, press and wriggle together.**

25) MULTI-PICKUP SYSTEM - CUSTOM WIRING: The A-D Electronics "Woodsome" end Pin Jack offers an additional (4th pole) to enable on board battery switching plus two separate signals, such as two pickups or a pickup and a mike, which may be routed via a stereo jack lead and mixed off board.

The easiest means of off board mixing for most musicians is the stereo to 2 x mono "Y" lead. Headway is able to offer the 4 pole end pin jack and the "Y" lead. "Y" leads terminating in 1 mono jack and 1 mono XLR/ Cannon are also available.

Core signal wires would be connected to tip and ring respectively, with both outer braids to one larger earth terminal. The black or blue battery wire connects to the 4th remaining (or additional earthing) terminal.

The more crucial signal should be wired to the tip, as this would be the sole signal if a mono lead was used. Normally, for reasons of feedback rejection, the under saddle pickup is wired to the tip, to be most readily accessible.

"Y" LEAD JOINT CONSTRUCTION: Plan length to take comfortable account of cable reach width between mono input sockets used, plus overall length. Separately twist and tin the earth braids from the one stereo and two mono cables to be joined, as well as the four core wires. Place insulating/supporting shrinks (preferably glue filled shrinks) over 2 cores, and overall on braid, ensuring that earth braid cannot short to signal core wires when shrinks are in place. Solder connect the two pairs of inner core signal wires separately, side to side, then connect earth braid cables side to side. Put core shrinks in place and heat. Then solder connect earth braid to a copper outer wrap. Finally place outer glued shrink in place and heat until tightly covering and supporting all metal components.

26) CONTROLS - CUSTOM ADDITIONS: "SNAKE": Passive tone and volume controls may be added by connecting pots to the grey, lap screened output cable, and ensuring there is sufficient length to reach controls, and from controls to end pin jack. These controls work in a similar way to those on most electric guitars. We suggest making these pots fit 1.2" apart, centre to centre, to keep them in line with PCB tracking standards, as with HE1 Range.

If a third control is used for passive bass, the tone controls may be set 1.2" apart on a plane at right angles to top, with the Volume pot set 1.2" apart from either, or centred away from both.

Use braid screened cable, but terminals should not cause noticeable interference if left unscreened, as they would be running low impedance.

VOL POT: As if looking from the shaft side with pins pointing down, the right hand terminal would connect to the output wire (red) from the pre-amp, the centre terminal provides the output from the volume pot, while the left terminal would be earth (outer screen/bare cable).

You should further connect the earth to the body of the pot. We suggest 10k-25k(A) log for Volume, using a 4.7k resistor on the centre output terminal of the volume control.

TONE Or TREBLE POT: For adding to above, 10k-25k (B) Lin. is recommended. Connect 220 nF capacitor, between the output from 4.7k resistor above, and the centre terminal of tone pot (capacitor wired in series with tone pot). With above perspective, the Left terminal of tone pot connects to earth and body of pot, while right terminal is unused. Circuit diagram - available on application.

BASS POT OPTION : 50K Lin

Additional Bass control capacitors required for

i) Guitar = 47 nF

ii) Mandolin = 22 nF

iii) Bass Guitar = 120 nF

27) EARTHING NOTES - While pin bridges do not normally give such trouble, tail pieces should be earthed to the jack socket, to prevent hum pickup (50-60hz). If strings need to be earthed and cannot be addressed in this way, an earthed strip to contact with ball ends may be possible.

28) PROBLEM CHECKLIST: See under “How To Get The Best Out of Your Pickup System”: 13)

29) FEQ NOTES: HE1 Range FEQ's feature a broad “fixed EQ” cut to the mid range and a steeper low end body noise roll off. Mandolin FEQ versions feature treble cut.

Current FEQ's use an extended steel jack socket cover covering a new all discrete component PCB pre-amp, where jack terminals are soldered directly to the PCB. If the jack should require changing, carefully note position of tip, ring and earth terminals on jack in relation to colour of wires.

Beware! It is difficult to be more specific on jack changing here, as tip and ring terminals positions on jacks are sometimes changed or reversed, in different batches, or between different manufacturers. **Take care and use low temperature or low power soldering iron.**

Earlier FEQ standard models used a 2 p.c. alum. pre-amp rectangular box, bolted via a screwed on plate to a 2 piece End Pin Jack Socket, designed for Switchcraft™ and related.

The FEQ Pre-amps are intended to be mounted inside the instrument, with the socket fitting the end block in the usual way

The EPJ socket is supplied soldered on short flying leads, emanating from this pre-amp section. Terminal access is made by removing the 2 screws holding the mounting plate. **DO NOT BREAK THE TAMPER EVIDENT LABEL on the pre-amp section, AS THIS WILL INDEMNIFY GUARANTEES.** See socket wiring notes 23).

30) EXTERNAL "X" SERIES SYSTEM NOTES: (e.g HE1/G1 "X") are designed for belt/strap mounting of pre-amp, with the HE1 passive Pickup fitted under the saddle in the normal way. They are supplied with a **high screen angle jack lead (minimum 80% screen coverage)**, to connect between the output of the instrument and the input of the pre-amp. If you insist not mounting the pre-amp this way, you will get best results if you ensure that only good condition, high screen quality Instrument leads are used (**max.: 20' / 6.1m**) and the shorter the better!

For the **External pre- amps**, the PP3 (6F22) battery is mounted under the sliding plastic compartment cover, or via large central screw access to inside of metal box

The HE1/G1.X enables immediate access to full control and quick battery changing, without the need to drill instrument sides or alter instrument appearance. It also allows a number of instruments to be fitted with the HE1 Passive Pickup, at relatively low cost, which can then alternately use the single External Pre-amp.

31) GUITAR & MANDOLIN ADJUSTABLE BRIDGE PICKUP FITTING NOTES - The pickup is best fitted under indirect string pressure close to the strings, which can be done with a saddle, or with a wood sandwich structure, similar to the traditional Lloyd Loar design.

Lloyd Loar Style Wood Bridge Pickup Version: This methods retains a more traditional look and the sound of string against wood. *An off the shelf Headway version is planned.*

i) The top half of the **raisable bridge** is preferably lengthened to allow at least 1cm (0.4") of straight pickup, either side of the string courses, and the bend of the pickup, out of the slot, which may involve modifications to lengthen bridge base and widen daisy wheel positions.

ii) The top half of the bridge is cut length ways, about half way down, comfortably allowing sufficient room in lower bridge half, to make a routed pickup slot, along middle of lower half length, where there is 0.5mm-1mm protrusion of the piezo cable. This is sufficient to allow the top half to pressurise and compress the pickup, while under string pressure. The depth of the routed pickup slot should be around 1.2mm-1.5mm

iii) The end of the pickup slot is drilled, preferably at 45-60 degrees, but a 90 degrees angle may work under mandolin string pressure, subject to rounding off entry area.

Saddle Method: This method may be easier to implement than the above and offers a brighter, punchier sound acoustically and electrically, although clearly that is not the sound many players want.

An ebony, or black plastic piece, rather than bone may be used for saddle, which is let into slot in top half of bridge. See Pickup fitting notes on moveable bridges 15).

The raiseable function may be retained, by deepening the shallow hole for the bush/bolt to the base and allowing just the tip of the daisy wheel into a reduced depth hole in the top half. In addition, you must try to ensure that the top half has at least 1 cm either side of the string courses. A longer top half will balance string outputs better

The revised bush & top half arrangement allows more space in the top half to account for the depth of a saddle and the bend in the pickup.

The pickup bend takes **signal down through the leg of the bridge via joint to co-axial connecting cable,**

SIMPLE SOLID FLOATING BRIDGE PICKUP: As an alternative, with no saddle, merely rout a P/U slot into a continuous, even bridge base with no feet, to insert fractionally protruding pickup, under indirect string pressure, but in contact with body. This would be easier with a flat top instrument, but a rounded bridge base, shaped to a top, may be used as a guide for a router, when making a pickup slot.

A refined variation on this is to seat the pickup under indirect string pressure in the routed bridge base from a wood tongue, the bottom of which rests against the instrument top. The tone from these simple methods, with pickup further from strings, should be balanced, but woolier and woodier than an under saddle, less defined, more prone to body noise and feedback and with less treble. In other words, half way between a contact pickup and an under saddle pickup.

Then either take black/brown co-axial connecting cable, or thicker piezo cable:

i) through the top, under the leg of the bridge;

ii) out of the front or back, via a bridge base notch.

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