

The Seven and a Half Watt Solution

Rolling your own just got easier, more affordable, and more appealing—in one stroke. Art Dudley builds and listens to the Audio Note Kit One single-ended triode amplifier.

Audio Note Kit One amplifier: \$1250. Manufactured by you, distributed by Angela Instruments, 10830 Guilford Road, Suite 309, Annapolis Junction, MD 20701, (301)725-0451

Ask anyone who was a kid in the 50s or 60s and they'll tell you: Most of the pleasure of owning almost anything comes from putting it together. After that, not much is left. Whether scale-model cars, ships-in-bottles, paint-by-numbers, horse statues, or the once-ubiquitous Aurora Frankenstein (sorry, I'm from a generation that's strictly pre-"action figure"), all we really gained in the long run was practice dusting things. Not even gas-engine model planes had much of a life beyond the workbench: Chances are if you didn't remove a fingertip trying to start it, you got dizzy and threw up from standing in the same spot and turning around and around and around with that stupid tether in your hand. Why do you think they call it dope?

No, it took the Audio Note Kit One amplifier

to both remind me of the pleasures of building a working *whatsis* out of someone else's parts—and to teach me, once and for all, that there really is life after assembly.

Nor are the Kit One's pleasure's limited to nostalgia and pride of ownership. The finished amp is your ticket to the happening new world of single-ended, Class-A, zero-feedback, direct-heated triode amplification. And if at this price you assume the ticket has to be coach, think again.

I'll get right to it: For \$1250 and a week of evenings you can own one of the finest, most musical amps you've ever heard. I don't mean a decent, respectable amplifier, and I don't mean beer budget hind-end audio for the po' folks with children and mortgages, either. I'm talking spine-tingling, heart-wrenching, in-your-lap music. I'm saying: Mated to the right pair of (efficient) loudspeakers, this amp is probably better than what you have at home now—better, possibly, than anything you've ever heard, regardless of price.

It is also an absolute steal for the price—as a

worthy design, as an enjoyable learning experience, and certainly as a collection of quite valuable parts. I don't know what your time is worth to you, so I can't really judge this amp's potential value as a finished product to each and every reader. But I can say this: At \$1250 and for the quality of components that come packed in the carton, no one is getting rich off this thing. And the finished amp, in the context of other single-ended triode amps available today, makes me wish our rating system could register more than three checks for *value*.

Stop reading here and go to the phone and order one right now. My feelings wouldn't be hurt in the least.

But for those of you who want to stick around—let's back up just a minute and ask, What's this single-ended triode business all about?

If you're new to *Listener*, perhaps you'll forgive one more transparent attempt to stimulate back-issue sales and allow me to direct your attention to Vol.1, No.4 and the article "Tube Technology" by Scott Frankland (a good—and understandable—starting place for all things *tube*). Otherwise, for the here and now, a brief and very general background explanation may have to suffice...

The great majority of audio amps have output sections that deal with sound—which exists electrically as a sinusoidal wave, with positive-going and negative-going halves—by splitting that continuous wave about its axis and sending the two halves to two separate output devices or sets of output devices (tubes or transistors). This is called push-pull amplification.

The other way to do this job is to select an output device (and a set of operating parameters for it) whereby the entire musical waveform, positive-going and negative-going halves alike, can be handled by a single device or set of devices, tubes or transistors. This is called single-ended amplification.

Both amplifier types have been around since

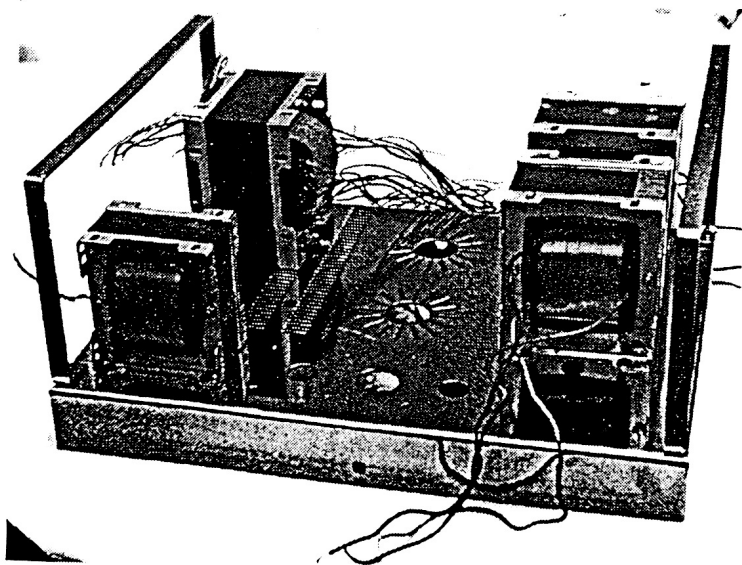
the year after Mahler's death, believe it or not. But the single-ended amp fell into disuse, as its push-pull counterpart was considered superior in many ways: Push-pull amps can be made to be much more efficient (*i.e.*, greater gain or power output for a given operating voltage/current), and they boast the theoretically total cancellation of second-order harmonic distortion products, with which tube amps in particular are otherwise crawling. (This cancellation happens when the two halves of the sound wave are put back together.) A push-pull output circuit also makes it possible for the designer to select and configure output devices for comparatively high power output into a loudspeaker.

But over the past twenty years or so, a number of hobbyists began to reconsider the single-ended approach. They looked at the flies in the push-pull ointment: the need for that additional wave-splitting stage; the need to incorporate some arrangement for electrically balancing the two halves of the output section as perfectly as possible; the fact that, all other things being equal, push-pull amps tend to produce audible—and decidedly unmusical—third-order harmonic distortion...

And then these folks considered how to counter such shortcomings: A single-ended design would eliminate the need for a "phase splitter." It would also eliminate the need for the circuitry used to balance the two output section halves. Its characteristic second-order harmonic distortion would be more musically consonant, at once harder to detect and easier on the ear.

And: A single-ended triode amp could make for a much simpler amplifier, with fewer signal degrading parts. And an amp using a directly-heated triode—an ancient tube with only four pins, for Heaven's sake!—could take that beneficial simplicity even further.

The problems? Finding reliable sources of those old tubes. Designing and winding output transformers that are linear across the entire mod-



The first steps involve mounting the transformers to the chassis; here's the correct positioning. By the way, the chrome finish shown in these photos is an extra-charge option; the standard look is a grey enamel finish that's actually pretty cool in a fifties-ish way.

ern (read: a lot wider than when these tubes were designed) audio bandwidth. And finding some way to work around these amps' admittedly limited output power.

Problems one and two have been addressed pretty successfully over the past few years, thanks largely to some enthusiastic builders in Japan; problem three we're still struggling with. But all this points to one very important consideration, one that has been largely overlooked/misunderstood in the audio community at large: The modern single-ended triode amp is not just an exercise in audio antiquity. Yes, the designs of the directly heated triode tubes in popular use today—and in some cases the tubes themselves—are indeed pretty old, often dating as far back as the 1930s. But beyond that, these are completely new, modern devices. Nothing like the single-ended audio amplifier of the 1990s has ever existed before.

The history of modern, high fidelity single-ended amps follows a trail blazed by the likes of Dennis Had, president of Cary Audio, and Nobu Shishido of Wavac, as well as independent designer/builders such as J.C. Morrison, Herb Reichert, Gordon Rankin, Noriyasu Komura, Arthur Loesch, and Don Garber. But the person who really started the ball rolling was a Japanese cable designer ("audio silversmith" one magazine called him) named Hiroyasu Kondo. In 1981 he produced his first *Ongaku*, a single-ended integrated amp that has since passed into legend for its startlingly lifelike sound—and startling price. (An *Ongaku*, which contains a little more silver than the safe at Oneonta's largest bank, will set you back about \$90,000 in 1996 dollars.)

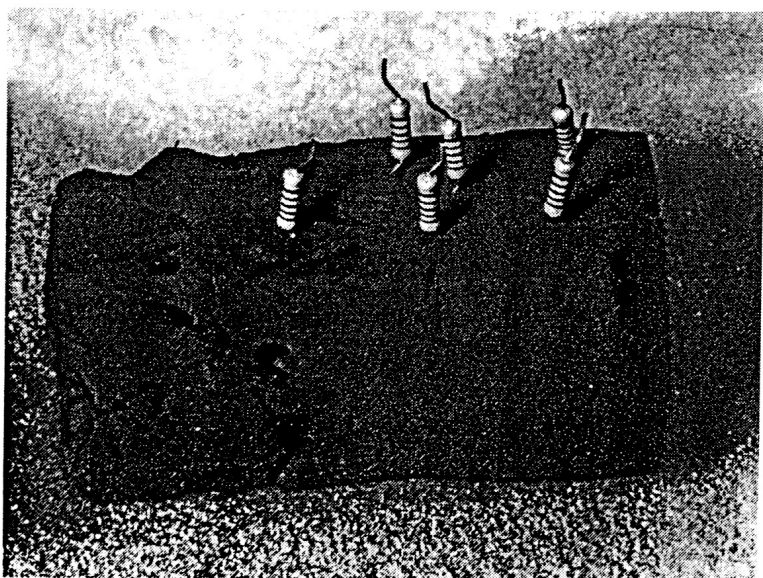
Kondo's company, Audio Note, spawned a less expensive line of single-ended amplification created by his European Distributor, Peter Qvortrup, and English audio engineer Guy Adams. That firm, since dubbed Audio Note UK, continues to produce and distribute new Kondo-inspired designs, of which the Kit One is but one example.

It is in fact an interesting product with a fairly unique genesis: As Audio Note UK got more and more into the business of selling their exotic silver wire, hand-made capacitors, and custom-wound transformers to other builders (some made by Kondo himself, some simply inspired by his theories), more and more hobbyists were approaching them asking for complete sets of parts for their own homebrew amps. So—why not put everything that hobbyists would need into a single box; give them a good, clean circuit design; write a set of instructions; and reach a potentially wider audience?

Why not, indeed.

The Kit One is a single-ended basic amplifier—as opposed to an integrated—and although it does sport a volume control, it's at its best downstream from a good quality preamp. (I'll return to that point later on.) From its pair of nonsense input jacks, the music travels to a 6SN7GT, a small-signal twin triode used here as a voltage amplifier. From there, a pair of 5687 twin triodes take over in what's known as a "series regulated push-pull" driver stage. (Note, though, that "push-pull" in this case refers to the stage's electrical operation; the signal is at no time sent to a phase splitter, as in the more traditional sense of the expression.) What the drivers drive is a pair of 300B output tubes, one for each channel—directly heated triodes that are fast becoming the hi-fi equivalent of nose rings at a hip coffee shop.

As is virtually always the case with today's single-ended triode amps (but not so with most single-ended amps using pentode output devices), the Audio Note Kit One employs no feedback, "local" or "global." Freedom from feedback—which is a method of achieving low distortion figures by feeding all or part of a gain stage's output back into its input (sort of like cows do with their multiple stomachs)—strikes this dilettante as a good thing. But then, because even profes-



When you build this kit you're going to have to tin a lot of resistors with solder. Make it easy on yourself by sticking them in a hunk of that green stuff that florists use for flower arrangements. (Learn from my mistake and ASK before you take it from your mate's plants, though.)

sional engineers don't seem to agree on this point, and because I believe that reviewers who really don't know what causes what in a product's sound should pretty much keep their mouths shut and not pretend otherwise, I'll refrain from further input or brickbats or backtalk on feedback.

The power supply centers around a 5U4G rectifier tube, with a hefty custom choke in series with the primary windings of the output transformers. The only solid-state devices in sight are a pair of voltage regulators for the 300B heaters and the bridge rectifiers that precede them.

The parts quality is basic, but in an Audio Note sort of way. In other words, some things are ritzier than you might've expected (paper in oil coupling caps and silverplate wire between the driver stage and the 300B grids), some things are humbler than you might've expected (that volume pot, the power supply capacitors, and the rest of the hookup wire), and virtually everything will confound the expectations of those who believe that adding the latest designer caps or an oversized power supply will "improve" any product. Single-endedness is not the Kit One's only unorthodoxy.

But the bigger question for many will be: How easy is it to build?

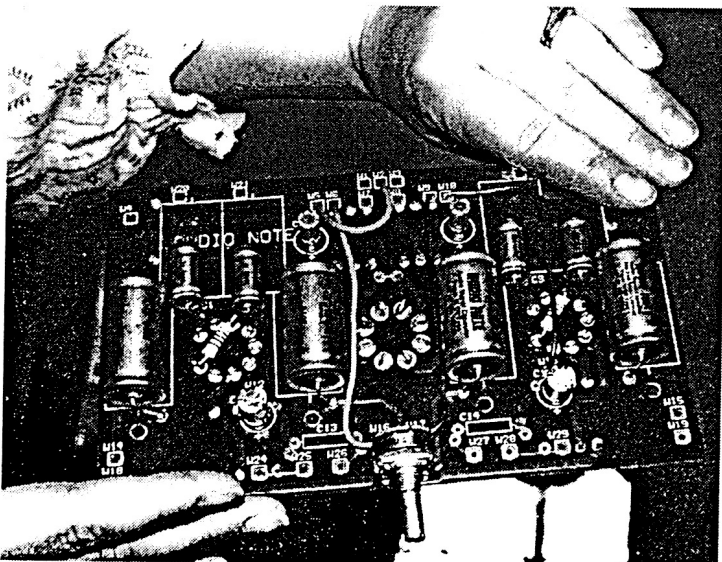
In a word, *moderately*—assuming that you are patient, reasonably adept with hand tools, and good at following instructions. Believe it or not, I had never before built an audio kit, and I came out okay—mostly, I think, because Audio Note packages all the parts so cleverly. (All the power supply board parts are together in one bag, all the filament supply board parts are together in a different bag, and so forth.) My only parts gripe is that I didn't get quite the amounts of certain colors of wire that the instructions say were enclosed. I had enough for the job, strictly speaking, but since in some cases the individual leads required added up to more than the bulk I was given, I had to cut some a little shorter than the instructions suggested.

At the end of the day (okay, *six* days—or six evenings, really), I had made only one mistake that I'm presently aware of. And, luckily, that mistake had to do with the input/driver board (in looking for wiring points, I misread W12 as W2), and so the only harm done was that one channel didn't work until I took the amp back apart, figured out what it was I'd screwed up, and corrected it.

But you need to take this stuff very seriously: If I had made the same mistake on the power supply board, I might be buttoning my shirt with my teeth these days, as some fairly serious voltages are on tap here. And: The mistake I made could have been avoided if I had taken seriously the step that read: By now you have reached the final stage of assembly...check through the instructions up to this point to see if you have missed anything or made any errors.

But then, let's not let Audio Note completely off the hook. The mistake I made might also have been avoided were the instructions a little better illustrated. (A few photos, in particular, are sorely needed.) That might also have cleared up the few moments of heartbreaking confusion I suffered along the way. These included steps A-1 through 8 (which surfaces of the transformers are the bottoms, which are the sides? I had to refer to the photo on the sales flyer to see what they had in mind); step A-29 (which side of the switch is the "live" side? I figured this out, but only after thinking about it really hard); step B-4 (which side of the voltage regulators face toward the board? I got this right only by reading way ahead—and, again, doing lots of unpleasant thinking); step B-7 (*huh?* Where exactly does that wire go?); and step C-10 (which 300B valve base do they consider the "left" one? Looking at the front of the amp, one base is *behind* the other!). Step A-38, on the other hand (*Have a drink, you deserve it!*) gave me no trouble at all.

So, my very strong advice: If you build this kit, read the instructions all the way through, twice,



Mrs. Dudley shows off her ring (again) and displays the almost-completed input/driver board. Sharp-eyed readers will find the wiring mistake I refer to in the text; do not use this photo as a wiring guide!

before starting work on it. And go back and check your work at the end of every section. Everything makes sense, eventually; there's a reason for all the things you're asked to do; and it's all worth it in the end.

Really worth it, in fact—although my first listening session with a finished Kit One wasn't quite what I expected. When I finally sat down to listen to the completed/corrected amplifier, I was struck by how completely *different* it sounded compared to other amps of my experience, even other single-ended designs.

One thing that didn't surprise me, though, given my previous s-e experience, was the believably tactile quality of musical sounds in its midrange. Neither timbral perfection in specific nor overall tonal balance was in place that first evening, but there was still a reach-out-and-touch-it quality to guitars, solo violins, voices—even drums.

Also: Driving the big Spendor SP100s (sensitivity: 90dB per watt per meter), this low-powered amp (about 7-1/2 watts per channel, depending on who you ask) was as dynamic as all get-out. Two of my favorite Bruckner recordings (Bohm's *Third* on London and Horenstein's *Fifth* on Intaglio) went from zero to sixty with ridiculous ease. More important were the system's microdynamics with this amp in place—its ability to make all music sound un-flat, un-homogenized, un-mushy.

You know what all that comes down to, especially taken in comparison with other amps? The Audio Note amp *breathes*—or at least the music played through it does. There's a realistic ebb and flow of musical feeling that this thing gets crazily right, and I've only heard one other amplifier do that in my system. (And that was the Sunday afternoon when I got to hear a not-even-totally-warmed-up Ongaku at my place.)

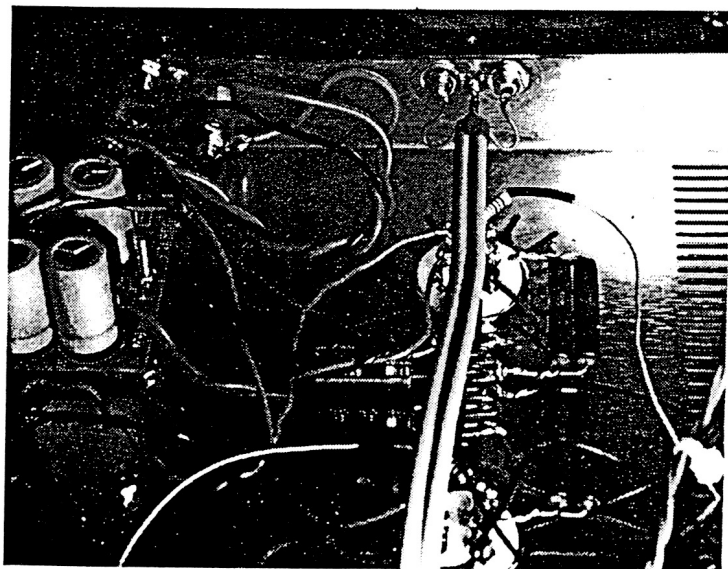
But it was also obvious that the Kit One hadn't even come close to breaking in yet. It was a little colored, really, with all instruments and voices sounding as though they didn't care to

venture too far from the comfort of the midrange—a little too *blatty*, even, in some cases. There wasn't a lot of air at one end, nor a lot of tightness, rhythmic aplomb, or surefootedness at the other (although, in truth, it "played tunes" in the midrange perfectly well).

The remarkable thing was: During that first week, to listen for just an hour or so was to hear the Kit One amp break in and actually, obviously change right before your ears. Not even the dweebiest of tweaks nor the tweakiest of dweebs could've missed it. And I suppose, when you think about all those brand new parts soldered together in an amp that hasn't had the benefit of a typical factory burn-in, "soak test," or whatever you want to call it, it should've come as no surprise. In any case, two or three weeks down the road all was well—and by then the Kit One had made itself at home with my music.

I remember describing the gorgeous midrange purity and directness of the Cary 300SEI—the first s-e I'd ever really lived with—a few issues back. And while the (more expensive) Cary remains, in my experience, the product to beat in that regard, the Audio Note fairly nips its heels. The Kit One delivers the same categorical strengths—if a mite less—and yet actually sounds more extended, more open, and more rhythmically capable than its Carolina cousin in the bargain.

As to that last quality: No one would ever mistake the sound of the Audio Note in tandem with those big, soft Spendor woofers for the sound of, say, a Naim 250 on a pair of SBLs. Electric bass notes (try R.E.M.'s "Maps and Legends," or just about any tune on The Move's somewhat bass guitar-happy *Message from the Country* album) don't always fall right on the money, timing-wise, with this amp. But the result is more "puffy" than sloppy or frustrating, and so I'd still rate the Audio Note as "acceptably good" in the timing department—an accomplishment which, as a part of a package



At the top of this photo is the rear panel of the amp. This gives you a good idea how to connect the input cable to the RCA jacks. (You need to connect the negative and shield conductors to the negative tabs of BOTH jacks.)

that includes so much timbral, tactile goodness and virtually no departures from correctness of perceived pitches, puts this amplifier squarely on the map.

Yes, I still have to keep coming back to it: The Kit One has that purity, that immediacy, and that sense of musical *rightness* that consistently lessens the edgy neurosis we take for granted when trying to substitute hi-fi for the real thing. During my first few experiences with single-ended amplification, I found that particular characteristic so remarkable—and remarkably different from what I was accustomed to—that it could be positively startling at times, especially on albums newly discovered to be well recorded. But now I find, after using the Audio Note Kit One every day for over a month, that the experience is less revelatory than *comfortable*. It's like seeing a crush develop into friendship: Having a musical system is really about relaxing, and about abandoning the edge of one's seat in favor of something more comfortable and more conducive to getting the message.

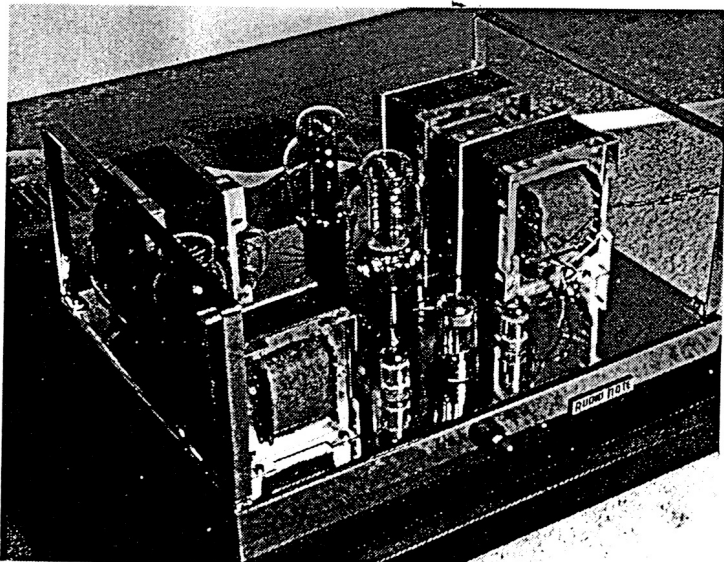
And I keep thinking: Hell, this is just with a stock Kit One. And there is in fact an "official" Audio Note upgrade path for the amp, whereby more exotic wires, capacitors, resistors—even, ultimately, other brands of vacuum tubes—can be substituted for the originals in an effort to wring more purity out of this already very pure, very simple design. And that's without considering third-party modifications for the Kit One, the likes of which will no doubt surface as the user base continues to grow. Our friend Harvey "Gizmo" Rosenberg, who bought and built one of the first Kit Ones, has already described a neat power supply refinement. And Tom Tutay of Transition Audio Design in Florida (904/244-3041) offers very affordable plans-n'-parts for those interested in removing the volume pot, changing the input characteristics, and other mods. And this, I suspect, is just the beginning.

Oh, yes—the volume control. Even though the Kit One sports but a single pair of input jacks and has no provisions for source selection, it does have enough gain in its stock configuration to be driven directly by a CD player or other such line-level source. I tried it—but I really don't recommend the approach to anyone interested in getting all they can from the amp. Upon first listen, "direct drive" is beguiling—seemingly even purer than with a preamp in the chain. But in every case, I nonetheless considered the sound more involving, more dynamically interesting, with a preamp in the works. So far, by the way, I've used the amp with a Conrad-Johnson PV2, a Conrad-Johnson PV12, the preamp sections of Audio Note's own Oto and Meishu integrations, and one or two other notables. But my best results so far have been with the pretty little Cary SLP-94L, a line-level device which, at \$1995, is actually a bargain among hand-wired preamps.

The bottom line: If you have efficient speakers (87dB minimum for a small room, 90dB minimum for anything larger than 1400 cubic feet or so), a good preamp, at least some soldering experience, and a little room left on your credit card, you might want to do as *Listener* has done and buy an Audio Note Kit One. (We're not buying the evaluation sample, though: The folks at Audio Note NYC were nice enough to let me assemble their loaner for this review, but I'm honestly looking forward to doing it all over again next month.) The Audio Note Kit One delivers great music, great sound, and it arguably points the way toward a whole new generation of audio products—all for an inarguably low price. This amp has all the makings of a classic.

Quality: ★★★★★-1/4

Value: ☑☑☑



The finished product—checked out, tubed, plugged in, and ready to scare the cat.



An important gauge of any product's goodness is contained in the answer to a very simple question: *Would I buy it?* Sometimes we at Listener do—buy things, that is. We can give away stars and checks 'till the cows come home, and while that's not without meaning, you readers ought to know when we've voted with our own hard-earned for this or that piece of audiostuff.

You also deserve some idea of the sorts of systems and rooms in which the products we review are really being used, a notion which was first acted upon some years ago by our friends at the absolute sound Magazine. Hats off to Harry.

And: This is a place where each of Listener's equipment writers can and will discuss hi-fi hardware outside the (constricting! old! starting to get in the way!) traditional audio review setting.

We'll make *The Home Fires* an ongoing thing so we can update this information on a continual basis. Those interested in such things (some of which may be mildly technical) can turn here for the precise details on what we own, how we use it, and what if any changes we've made since taking it out of the box—ed.

from Art Dudley

My basic hi-fi rig underwent a couple of fundamental changes during the last year...

First, my on again/off again love affair with tubes is on again. This was, I think, spurred by the time I spent in 1995 with the Cary 300SEI integrated amp (Vol.1, No.4). It was my first exposure to the 300B power tube, as well as my first taste of single-ended rather than push-pull circuitry in a hi-fi power amp. (As far as I know, all active preamps are single-ended, although given their nature as voltage- rather than current-gain devices, a direct comparison between them and power amps in this regard is not really relevant.)

Like common sense and the kindness of strangers, I have long depended on solid-state amplification from Naim, which I still admire and enjoy and which I still depend upon as a reality check in many senses of the term. But by the time

I built and then heard the great Audio Note Kit One amplifier (Vol.2, No.2), I decided that it was time to ante in and see where this \$1400 road leads. I bought, and of course built, a second one for myself after returning the first to the distributor. (By the way, while Audio Note USA is the State-side distributor for all Audio Note components from the UK and Japan, the company's individual parts and kits are handled over here by Angela instruments. They can be reached at 301/725-0451, or you can visit their website at www.angela.com.)

Since then, I've upgraded some of the parts in my Kit One, staying more or less faithful to the upgrade path/parts hierarchy as laid out by Audio Note.

For the first upgrade level, I replaced all the electrolytic capacitors (other than those on the

power supply board) with high quality Black Gate "electron transfer" capacitors. For the technically minded: Four of the caps in this kit comprise a part of the "pi" filter for the DC filament supply; the remaining eight are all either bypass caps on the input/driver board or cathode bypass caps for the 300Bs (one per tube). The result of this upgrade was a greater sense of listening ease and an increase in that lovely quality where the music seems to "breathe" in and out more naturally.

Level Two entailed replacing just about every resistor in the amplifier (except the big cathode resistors) with Audio Note tantalum resistors. This upgrade kit also contains a high quality encapsulated Noble potentiometer intended to replace the original and comparatively humble volume pot. (It wasn't until recently that I installed my own replacement pot, though, since for a while I decided to simply eliminate it by bypassing it entirely, substituting a pair of 180K resistors for the missing shunt resistance.) Level Two impressed me as a very subtle sonic refinement—probably worthwhile in the long run but not an Earth-shattering sort of thing.

Level Three, which is as far as I've gone, provides the most walloping improvement of all, I think. This involves replacing the amp's four coupling capacitors with Audio Note's copper foil/paper-in-oil types. A lot of what attracts me and other listeners to this style of amplifier—the pureness and immediacy of the single-ended approach—gets turned up when you do this. Very strongly recommended to all Kit One owners

In truth, I actually *have* gone one step further, although I don't think it's yet part of the prescribed upgrade path. I replaced the big 220 microfarad electrolytic cap on the power supply board with an even bigger 100-plus-100 micro-

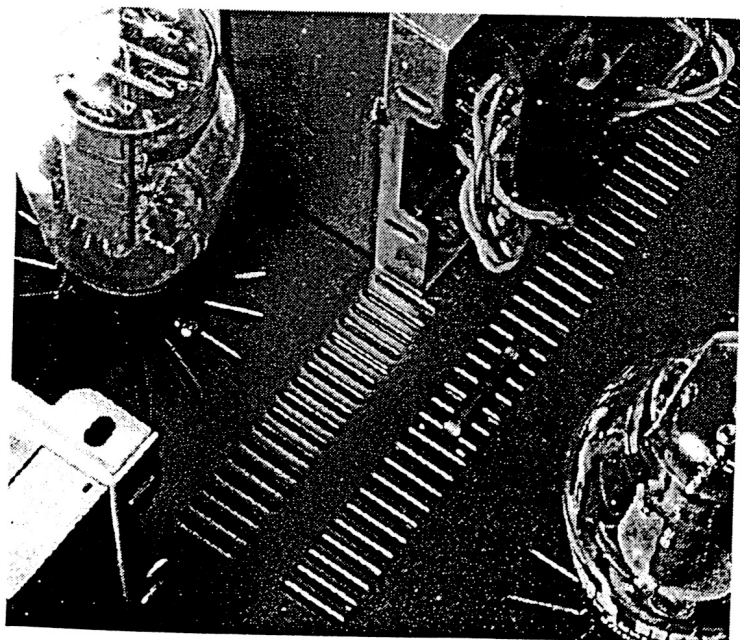
farad Black Gate. This beautiful (God help me I should think a capacitor is beautiful) but expensive part is not exactly a drop-in; it's too tall to mount to the supply board, so I wound up mounting it laterally alongside the board, running heavy wire jumpers to its electrical contacts and fastening one end to the chassis with a flange mount and bolt (drilling required) and securing the other end through the rectifier tube's ventilation slots with a big cable tie. The result is an even bigger increase in the music's ability to breathe: In fact, this part is easily worth every penny (although you sure wouldn't think so until it's charged up for at least a week). The part cost \$125 at the time I got mine, but Black Gate capacitor prices are changing all the time. For the current price of this and all the other upgrade parts mentioned above, contact Angela directly.

I am, by the way, looking to do a minor circuit mod, one which entails removing the voltage regulation from the 300Bs' filament supplies and which may, once taken to its logical extreme, involve buying a separate filament transformer. I'll probably have it in by the time you read this, and so I'll talk about it next issue.

As to my preamp...well, as people who know me know, this area is fraught with uncertainty.

To get right to the point, I'm still between preamps. There are some very nice ones out there, but not anything I can afford to buy today. (You'd be amused to know how little money I used to start this magazine two years ago—a point of some pride, I admit, but also a point of relevance to how very small my income remains at this time.) And I sold my lovely old Conrad-Johnson PV2, a dumbass move for which I still kick myself.

So what have I been using? A few months back the New York triode mafia, *aka* Audio Note



(Reprinted from 'Listener' magazine Vol.3 No.1.)

Look closely and you'll see where that new power supply cap is fastened.