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THIS MONTH'S BOOK REVIEW:
Making Sense of Sound
by Alvis J. Evans

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  - Special Quality Types
  - American Types
  - Other Types

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DIY NEWS

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Gary Devon designs a great new amplifier that's easy to build and inexpensive

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ADVANCED SPEAKER DESIGNS
Gary Devon reviews a book on sound and sound products

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Maplin Electronics has launched its new 2000/2001 catalogue with a huge range of electronics products, over £100 worth of money-off vouchers and many brand new lines.

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The website at www.maplin.co.uk also features full product range details and a secure on-line ordering service with up-to-the-minute stock checking facilities.

To receive a copy of the catalogue, which costs £3.99 or the CD-ROM for £1.99, visit your local Maplin Electronics store or contact customer services 0870 264 6002 www.maplin.co.uk

DIGITAL AMPLIFIER ON A CHIP

American chip manufacturer Cirrus Logic announced the forthcoming introduction of a digital amplifier on a chip. They issued the following statement during September 2000.

“Cirrus Logic Inc., the world's market leader in audio chips, today announced a significant advancement in Crystal® audio technology incorporating Pulse Width Modulation (PWM) that reduces power requirements for audio amplifiers, dramatically improves sound quality and reduces cost and complexity of design. Cirrus Logic's “true digital” PWM technology also solves many of the problems associated with electromagnetic and radio frequency interference (EMI/RFI) usually encountered with existing Class D amplifiers and hybrid analog/digital PWM technologies.

The new digital PWM technology increases the efficiency of amplifiers from the industry norm of approximately 50% to near 90%. Existing systems that require 1,000 watts input to the amplifier to deliver 500 watts to the speakers, for example, can now deliver 900 watts from that same 1,000 watt input with Cirrus Logic’s digital PWM technology.

The fully digital PWM amplifiers also radiate significantly less EMI/RFI (electromagnetic interference and radio frequency interference) and because they are more power efficient, dissipate less heat (i.e. wasted energy).

Taken together, these advances mean that designers can reduce the size of a typical power amplifier by a factor of four, allowing the amplifier to be built into a speaker or other small enclosure. Increased efficiency also facilitates battery-powered amplifiers that can run up to three times as long per charge compared to conventional amps.”

Although aimed at "OEMs" (Original Equipment Manufacturers)

keep an eye open for the appearance of such chips on the open market soon, through suppliers such as Maplin. DIYers can then knock up a quick digital amp. over the weekend, just to impress the neighbours.

Cirrus Logic, Austin, Texas.
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Valves for Beginners

Gary Devon designs a budget 15W valve amplifier using the sweet sounding EL-84 output valve. It's a beauty for beginners.

KEL-84 designed by Gary Devon
Introduction by Noel Keywood
Sound quality by Simon Pope
Kit information by Nick Lucas

Valve amplifiers offer superb sound quality. They have a sweetness and lucidity that defies transistor amplifiers. Trouble is, commercial valve amplifiers are expensive, whilst building one at home seems a daunting task to many people.

Here is an inexpensive, easy to build design that has enough power to go loud with modern, sensitive loudspeakers. It's aimed at enthusiasts and beginners who want to experiment but fear committing sums of money and time on the unknown.

KEL-84, as we call it, produces 15W per channel, has choke smoothing and is as quiet as a dormouse, when there's no music playing that is. With a printed circuit board (PCB) to minimise wiring errors, this one easy amplifier - easy to build, easy on your wallet and on your ear!

Powerful valve amps of 40W or more run at very high voltages (500V+), demanding expensive transformers and capacitors. High power output valves are costly too and, eventually they need replacement. Here in Hi-Fi World towers, where enthusiasm overcomes fear, we've had plenty of experience with esoteric high voltage designs. Our masterpiece was a 211 amplifier running at 1200V with transmitter rectifiers in the power supply. This is something we would never commercialise though, for safety reasons.

The output transformers were wound by a power line transformer company solely for their knowledge of safety requirements at such high voltages. We provided the winding instructions; they worried about the insulation (so did we!).

KEL-84 is a kitten by comparison but at the same time nearly every valve enthusiast started out building a design like this, thinking 'wow!' and going on to build bigger and better designs. High voltage triodes like the 211 and 845 are amplifying devices to aspire to, or expire to if you touch the wrong pin.

Within the worldwide hi-fi industry there are plenty of valve enthusiasts, old and young, who entered hi-fi by first building a modest valve amplifier like KEL-84. The internet, that wonderful place where individual talent shines so bright, is another testament to the valve's (or 'tube' as it is more commonly known) wonders and mysteries. Yet it is not easy to find a starter design, especially one from a uniquely talented engineer like Gary Devon prepared to address real life wants.

Simple designs are often rather esoteric, such as low power (3W) single-ended types that offer great simplicity but also very little volume from everyday hi-fi loudspeakers. KEL-84 will go loud and it will give the same basic tonal balance and intrinsic accuracy as a solid-state amplifier. By this I mean it is fundamentally accurate. Vintage amplifiers were commonly unable to swing full output at high frequencies, a large reason for their comparatively soft, warm sound. It did not matter so much in the early days of the LP but CD and DVD produce a lot more energy up to 10kHz and slowly declining energy levels that extend past 20kHz; our measurements show. KEL-84 can swing full output at 10kHz and reproduce harmonics out to 50kHz (-2dB), the limit of DVD video sound track (24bit at 96kHz sampling rate) audio. It is a modern design that meets today's requirements. Distortion is low, through the use of Ultra-Linear working that requires output transformer taps. Noise is minimal too, with one of the lowest hum levels ever from a valve amplifier through the use of DC heaters. So although KEL-84 is a budget design, it isn't a cost cut design, nor an unsophisticated one. What you do get though is that wonderful sweetness, lucidity and naturalness that only valves provide.

Why do they sound different? We are not certain. Most of the theories, like the presence of second harmonic distortion, are a bit simplistic. Valve amplifiers with almost no distortion, like our Kit/Kat-88 designs, still retain all the clarity and freedom from harshness that is the hallmark of a valve amplifier. It seems likely that their sound is a function of many beneficial properties. It is rarely stated that transistor amplifiers are so inherently poor (i.e. distorted) that they must have feedback applied. It is not possible to design a solid-state audio amplifier without feedback (local or loop).

By way of comparison, valve amps are so inherently good that they do not need feedback. It is of arguable benefit. There is a paradox in the use of feedback: the more it is needed the (cont. on p10)
KEL84 CIRCUIT
by designer Gary Devon

KEL84 uses a very simple circuit, possibly as simple as is possible for a push-pull amplifier. The signal first passes through the input switching and volume control network then via a grid stopper (R4/5) to the input stage of the amplifier.

This first amplifying stage uses the pentode section of an ECF80 triode / pentode valve. Here, a pentode is used with associated components to get sufficient gain to enable some overall feedback to be applied, while retaining the sensitivity needed for an integrated amplifier.

R10/R11 is the anode resistor, whilst R6/R7 and C4/C5 form the voltage dropper and decoupling network for the screen grid (pin 3). R8/R9, C6/C7 and R32/R33 form the cathode / feedback network with compensation capacitor C16/C17 to ensure a clean square wave.

R34/R35 and C16/C19 form a step network across the anode load resistor of the input stage. These components are necessary in this circuit to form a well defined open loop response ensuring stability when the feedback loop is closed.

The voltage amplifier formed by the pentode feeds directly into the phase splitter which is of the Concertina type. This phase splitter uses the triode section of the ECF80 with equal anode and cathode resistors, R12/R13 and R14/R15. The DC potential from the anode of the pentode provides the necessary DC bias point for the Concertina.

The ECF80 is a commonly available valve. It was used extensively in televisions and radios of a bygone era. It’s a shame this valve isn’t used more often because it has a super smooth, colourful sound quality.

C8/C9 and C10/C11 are the DC blocking/coupling capacitors from the phase splitter to the output valves, a pair of EL84 pentodes. The EL84 really is an excellent little valve, one of the best sounding output valves available. It has a warm and sweet sound together with superb micro and macro dynamics which belie it’s relatively small power rating.

Also, modern EL84s are rugged little valves, especially the Russian EL84M which has an increased anode power rating of 14W as compared to the 12W of Mullard’s original.

In KEL-84 they are operated with cathode or automatic bias. The cathode resistors R24/R25 and R26/R27 develop the bias potential and decoupling is performed by C12/C13 and C14/C15, R16/R17 and R18/R19 are the grid resistors and R20/R21 and R22/R23 are grid stoppers.

The output transformer has Ultra Linear taps to allow experimentation with this mode of operation. These taps are at 12.5% of the total primary winding which is a little less than that used in vintage amplifiers, where 15% to 20% was commonly used for the EL84. Ultra Linear operation attempts to convert the pentode’s characteristic to something similar to that of a triode. Hence Ultra Linear’s other commonly used name which is “partial triode operation”. If one could imagine the screen grid being connected directly to the anode, then the valve would operate as a triode. At the other end of the scale, with the screen connected directly to the H.T. line then we have pure pentode operation. Ultra Pentode and Ultra Linear operation can be tried. With triode operation the power output will drop drastically however; We didn’t get enough time in the lab to get measurement results for all these operational modes, but we will try to publish results and modification tips in the next supplement.

The power supply is a semiconductor rectified unit with capacitor input. The H.T. line is further smoothed with an inductor and capacitor combination for the output stage. Further decoupling is achieved by R1 and C3 for the input stages.

The valve pin layout is shown below.
**GRID STOPPER**

A 'grid stopper' is a resistor used to prevent oscillation. It is wired hard up against the input of a valve by cutting the resistor's lead as short as possible. Grid stoppers range in value from 1k-5k usually. You can see them in the diagram above as R4/5, R20/21 and R22/23. They do not attenuate the signal since they are working into a high impedance of megohms.

**LOUDSPEAKER MATCHING**

Valve amplifiers are 'load matched' sources. Ideally, they should see an even 8ohm load (or 4ohms with a 4ohm tap). Very large load variations affect frequency response slightly, power decreasing where there's a large mismatch. The effect is not great and feedback in KEL-84 minimises it. A sensitive loudspeaker with an even impedance characteristic is the best choice. We designed KLS-14 as a good match, and our bigger KLS-9 floorstander is also very suitable. A good commercial floorstander would be the Acoustic Energy AE2 or Quadral tested in this issue (p.11).

**POWER SUPPLY FOR BOTH CHANNELS**
MEASURED PERFORMANCE
KEL84 produces 15W into an 8ohm load, which with a sensitive loudspeaker will give good volume levels in the average room. Some of the floorstanders we test this month, especially the sensitive Quadral with its flat impedance curve, are a good match for a small amp like this, although in practice valve amps are far more able to cope with difficult loudspeakers than theory suggests. Alternatively, our KLS-14 kit loudspeaker is a good match, or for those with the floor space KLS-9 is also suitable.

Frequency response extends from 17Hz up to 30kHz (-1dB) with a smooth roll-off above this frequency, so KEL84 covers the audio band and beyond quite sufficiently.

The use of d.c. heaters keeps hum down to a very low 0.4mV on each channel, making it virtually inaudible even at the loudspeaker. We usually aim for 1mV, which is inaudible at the listening position, but can be heard as a gentle hum at the loudspeaker. Some find this disconcerting, even though it does not affect sound quality. Directly heated triodes like 300B and 211 produce 2-3mV of hum even with hum bucking, yet have a reputation for superb sound quality, so hum is no arbiter of quality. However, it is satisfying to produce a silent amp and KEL84 manages to be supremely quiet. Hiss is just about inaudible at -98dB CCIR weighted.

The use of ultra-linear operation where the screens work from primary tappings contributes to a low distortion figure of 0.02% at 1kHz, 1W output. Distortion rises to 0.15% at 10kHz, 1W output, comprising second and third harmonics only. At full output distortion rises to 0.3% in the midband and 1% at 10kHz, but again low-order harmonics only appear. This is a good, clean performance, free from the higher order harmonics that add roughness and grittiness to an amplifier's sound. Indeed, a valve amp's sound usually thickens up and gets muddled at overload, rather than producing the ripping sound of solid-state, mainly due to the lower levels of feedback used. This is why valve amps seem to go much louder than their power output suggests.

KEL84 measures well in all respects. It's a quality design for beginners that offers a sweet alternative to solid-state, since the EL84 valve has a great reputation for sound quality.

At right: a 1kHz square wave with clean leading edges, free from ringing.

SOUND QUALITY
The quality that can be gleaned from this amp is a fine introduction to the joys of the valve sound. The KEL84 will highlight all the intricacies and depth of detail in your favourite recordings whilst retaining a warmth and fullness. This combination of both detail and warmth is almost the exclusivity of pure valve amps and is rare at this price point.

Playing an Opus3 recording of Eric Bibb's 'Good Stuff' highlighted just what this amp is capable of. Using our own KLS14 high sensitivity, infinite baffle standmount KEL-84 revealed a delicate yet controlled sound. This recording is all-acoustic and guitars had ambience and an luminosity that was very involving, with details such as hand movements along the bridge as clear as a bell. Eric Bibb's plaintive voice was positioned nicely forward of the speakers, with a touch of warmth added to the slightly dry voice. This amp excels with this type of fare.

Moving on to the excellent SACD/CD hybrid disc of Faure and Ravel's piano trios on the Hyperion label, the KEL84 demonstrated its deft and graceful handling of the music. The imaging and depth in this recording is near perfect and KEL84 made the most of the simple but effective mix. Balance between the piano and strings was perfect - the piano placed, with the right amount of sonic weight, slightly to the back right whilst the string soloists bowed with dexterity in front. The KEL84 handled the dextrous playing deftly and gracefully, bringing a high-end sound to the performance.

This amplifier manages to combine presence and depth to recordings, matched by a smooth and rounded overall sound which simply defies it's humble price tag. It has good, controlled bass weight and an exceptionally sweet sound in upper frequencies. It's a great introduction for those uninitiated to the valve-sound world, a subtle and sophisticated performer for those who crave more presence from their music.

SP

(continued from p7) worse an amplifier must be. That it works is unarguable; that it is the real solution is arguable. If amplifiers were better in the first place they wouldn't need something to make them work properly.

Although KEL-84 has feedback applied it is a relatively small amount, enough just to 'tickle' the performance figures so they are modern and appropriate, as people expect.

Then there's the sheer simplicity of valve amplifiers. Fewer components and fewer amplifying devices make for a cleaner, less coloured sound. They are very transparent sounding and particularly amenable to tuning by the addition of special high quality components.

Simplicity makes assembly easy for beginners, and valves are robust too. They will survive abuse. They are well suited to DIY.

Valves do wear out of course, having a life of a few thousand hours. The EL-84s used in this amplifier are plentiful though and cheap. Our use of auto-bias means bias re-adjustment is unnecessary when a valve is changed.

With 380mV input sensitivity KEL-84 will match any modern source, be it MD, CD, DVD or tuner. So it can form the centre of a system. It's always satisfying to build your own kit and this is a great way to start out. The amplifier's easy going, fluid sound will make it all worthwhile.

NK

SAFETY
Although KEL-84 is an easy build we do not recommend you tackle it if you lack simple basic skills, such as the ability to solder, and are unacquainted with electricity. Exposed electrical connections inside carry potentially lethal voltages (320V).

Safety gloves (650V DC rating) are necessary when testing, since they make electric shock impossible. See p11 for price.
THE KIT

KEL-84 is compact, with a footprint not much larger than a piece of A4 paper. Although designed for the budget conscious, we have given it a classy look with a 3mm anodised front panel and custom made chrome knobs.

The main chassis is constructed from 2mm mild steel with a durable black powder coat finish. It is sturdy, giving KEL-84 a good solid feel, just how a quality valve amp should be!

Being an integrated amplifier it will accept five line level inputs, plus one tape monitor input, with a tape out included, all controlled from the front panel.

The phono sockets provided are all gold plated, as are the speaker output sockets, which accept 4mm banana plugs as well as bare wire.

The mains switch is positioned at the rear of the amplifier and is easily accessible. This avoids problems with hum pick-up from the mains wiring passing close to the input valve a potential problem when the mains switch is located at the front panel. The mains is received via an IEC lead and the back panel sports an earth post.

The KEL-84 weighs in at 10kg. External dimensions with valves are 300mm(w) x 270mm(d) x 150mm(h).

SOLDERING

The kit is based on a printed circuit board, since this reduces wiring errors. We find the biggest problem constructors experience are errors caused by bad solder joints. These generally have the appearance of a dull ball bearing of around 2-3mm diameter and are known as 'dry joints'. The main reason is constructors using a low wattage soldering iron with high temperature solder as thick as a pencil lead. All you need is an Antex 25 watt soldering iron that plugs straight into the mains, available from Maplin code No. FR I ZN.

An ideal solder to use is their 10m 22swg pack, code No. FR2IX. Both can be purchased for just over £12.00. Maplins can be reached on 01702 554000.

Our instruction manual includes a 'How to solder' section. To further assist in a successful build we have included in the instruction manual a pictorial reference of the kit in certain stages of build so you can make that all-effective visual check.

We also have a help-line that is manned 0.00am to 5.00pm Mon-Fri and a back-to-base repair facility if the worst comes to the worst.

The kit is based on a printed circuit board to facilitate construction. This is electronics by numbers in a sense. All external connections are made via PCB terminal pins once the board is in place. The trickiest part is the wiring of the signal inputs to the selector, tape source switch and volume control potentiometer. As long as you work methodically and identify each wire you will have no problem.

The amp requires no set up, you just turn it on. It is self-biasing so too valves can be changed without any need for adjustment. We hope KEL-84 marks the start of 'the beginners' entry into the wonderful world of kits, since you cannot beat the satisfaction of building it yourself.

Gary Devon is a professional designer who has worked for UK and Japanese amplifier manufacturers. He produces commercial designs for UK companies, as well as World Audio Design kits.

Gary has been designing valve amplifiers all his life and is acknowledged as one of the world's top experts.

Parts List

<table>
<thead>
<tr>
<th>RESISTORS:</th>
<th>CAPACITORS:</th>
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<tr>
<td>RI 2.2K, 2W</td>
<td>C11/C2/C3 100uF 450V 3</td>
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<tr>
<td>R2/R3 1M, 0.5W</td>
<td>C4/C5 0.47uF 400V 2</td>
</tr>
<tr>
<td>R4/R5 3K3, 0.5W</td>
<td>C6/C7 1000uF 10V 2</td>
</tr>
<tr>
<td>R6/R7 330K, 0.5W</td>
<td>C8/C9 0.22uF 400V 2</td>
</tr>
<tr>
<td>RB/R9 220R, 0.5W</td>
<td>C10/C11 0.1uF 50V 2</td>
</tr>
<tr>
<td>R10/R11 100K, 1W</td>
<td>C12/C13 0.22uF 400V 2</td>
</tr>
<tr>
<td>R12/R13 27K, 0.5W</td>
<td>C14/C15 0.1uF 400V 2</td>
</tr>
<tr>
<td>R14/R15 27K, 0.5W</td>
<td>C16/C17 2.2nF 2</td>
</tr>
<tr>
<td>R16/R17 470K, 0.5W</td>
<td>C18/C19 220uF 2</td>
</tr>
<tr>
<td>R18/R19 470K, 0.5W</td>
<td>C20/C21 0.1uF 50V 2</td>
</tr>
<tr>
<td>R20/R21 6.8K, 0.5W</td>
<td>C22 4700uF 16V 1</td>
</tr>
<tr>
<td>R22/R23 6.8K, 0.5W</td>
<td></td>
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<tr>
<td>R24/R25 270R, 1W</td>
<td></td>
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<tr>
<td>R26/R27 270R, 1W</td>
<td></td>
</tr>
<tr>
<td>R28/R29 100R, 0.5W</td>
<td>D1/D2/D3/D4 BYV96E 4</td>
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<tr>
<td>R30/R31 100R, 0.5W</td>
<td></td>
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<tr>
<td>R32/R33 750R, 0.5W</td>
<td>TRANSFORMERS</td>
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<tr>
<td>R34/R35 10K, 0.5W</td>
<td></td>
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<tr>
<td>R36/R37 10K, 2W</td>
<td></td>
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<tr>
<td>R38 220K, 2W</td>
<td></td>
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<tr>
<td>VR1 100k, log pot</td>
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</table>

KEL-84 INTEGRATED VALVE AMPLIFIER is available as a kit from World Audio Publishing Ltd

KEL-84 K240/120 (with valves) UK (inc. vat & p&p) £250.00 Overseas (exc. vat & p&p) £215.00

KEL-84 K240/120 (without valves) £225.00 £195.00

Safety gloves £10.00 £9.00

Call or fax Nick Lucas on: +44 (0)1908 218836 (9am-5pm, Monday-Friday) e-mail: orders@worldaudiodesign.co.uk order on-line from www.worldaudiodesign.co.uk For overseas freight charges, please call, fax or e-mail.
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Caught in the WEB

The world wide web is full of wacky DIY audio sites. Jon Marks checks out a few.

There's a place for everyone on the web. It's a world where Sony rub shoulders with DIYers - and the latter look more interesting! At least, to anyone reading this. The web is where exotic hi-fi interests can be given full expression, a place for tube amps and horn loudspeakers, a place where special interests and dedication shine brightly.

There are some great DIY sites out there, caught in the web. Here is a small but interesting section. Check out their links to move further afield.

Horn Speakers

MELHUISH HORNS  
http://melhuish.org/audio

Here's an interesting corner of a personal-interests site by New Zealander James Melhuish, situated in Massachusetts, USA. Ignoring the cats, car and rock climbing, the audio interest section covers both horns and full range drivers in useful depth. What makes sites such as James Melhuish Horns refreshing is a huge number of reliable links which add up to an extremely broad knowledge base.

When it comes to horns, there are lucid, informative discussions covering all stages of speaker construction, from choosing how low you want the speaker to go, through equations for throat area and flare expansion rates for exponential, hyperbolic and tractrix horns (usefully number-crunching by software on the site) to materials, assembly and measurement. If you really want to delve deep into the theory, the Resources section covers printed matter as well as electronic. All in all, a superb site that oozes the enthusiasm that'll have you heading for the work bench to assemble your next killer prototype.

KBAPPS HI-FI  
http://www.kbapps.com

This is another US site where there's a broad spectrum of hi-fi information, albeit with less in-depth, practical knowledge than you'll find on James Melhuish Horns. Again there are non-audio topics such as cooking, currency conversion and song lyrics, all putting in an appearance alongside guitar amps.

This site scores is for its on-line calculators that cover a wide range of enclosure and crossover types. If your maths isn't up to turning Thiele-Small parameters into box and port dimensions, let these little programmes take the strain instead. The subsequent advice regarding materials, driver placement, damping and cabling is all fairly basic, but for the beginner, these pages are a fine starting point on a DIY career.

If you're more concerned with bottles than boxes, there's a couple of interesting sections on valve theory, construction and care penned by R Aspen Pittman, head of Groove Tubes. Although the bias is towards the musician rather than the audiophile, there's still a lot worth reading here. The same goes for the sheets of specs provided for a range of common tubes like the 12AT7, 6L6, 5AU4, EL34 and EL84. Also to be found on Kbapps hi-fi is another handy links list.

_TT_
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A trip well off the beaten path this time, with an illuminating design by Ole Thofte, of Denmark. The subject is a full-range loudspeaker drive unit again, but this one is DIY and requires a little, erm, "inventive cannibalisation" of widely available parts. The transducer in question is omni-directional. Ole explains: "This project is inspired by the Walsh driver from the Seventies and especially by the DDD driver from German Physiks. This driver is very good, but expensive (about 2000$ per driver). Conus I will not ruin you since it will cost you 500 Dkr (85$) a pair to build, cheaper if you use recycled materials."

What follows is a concise, well-illustrated guide to producing this unusual driver and housing it in a tapered quarter-wave tube. In rough précis, take one full-range driver (preferably inexpensive if this is your first time!), remove the standard cone and replace with a much longer one made, in this case, from metallised paper. To whet the appetite for this weird and wonderful creation, there are two pictures of the finished device.

What appeals on this site is the imaginative design allied once more to an infectious passion for hi-fi and the desire to share discoveries.
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GOING JAPANESE

If you're into valve amplifiers in a major way one particularly rich vein to mine is the Japanese sites. The problem is access, as this can be alien territory unless you happen to read Japanese and have a computer with a Japanese character set. A number of sites have parallel English/Japanese text, but they are exceptions.

On Japanese sites hi-fi often shares with ham radio. A huge variety of pre and power tubes are in use, which can make the 'standard' selection seen in the West look very limited at times.

Finally, don't expect to see DIY equipment lashed up - Tango output and interstage transformers rule the roost, paper-in-oil caps are de rigueur and build quality is unbeatable. Output power rarely gets into double figures, and partnering speakers are high-sensitivity horns or the ubiquitous Tannoy dual-concentrics. On the other hand, if circuit diagrams are what you're looking for, scanning the oriental Web can be a rewarding experience.

ELEC LANDY
http://www2s.biglobe.ne.jp/~ja3wzt/

Presumably christened roughly after an album release by one Jimi Hendrix, Elec Landy is a site constructed by Yoshikazu Tanabe. Hogging the limelight is small power amplifier using Western Electric's globe-shaped 205 directly-heated triode fronted by WE102s. The design (for which the circuit is provided) is naturally single-ended and the output is well down in single figures.

Keeping the 205 company is a so-called 'universal amp'. This has a removable panel which allows the power valves and their associated components to be changed in one easy operation while leaving everything else untouched - a great way of checking out the sonic characters of various valves without major surgery each time.

EMISSION LAB
http://www.macnet.or.jp/pa/upi-k/

At this URL, Kishimoto-san has assembled a fine spread of amplifier pictures and circuit diagrams, including a 6GB8 push-pull by Toshiba. Although this might be an English-free zone, the pages covering the 2A3 and 300B are well worth a glance, as is the gallery of cartridges like Accuphase's AC-3.

MACHIDA LABORATORY
http://sun1.maizuru-ct.ac.jp/control/machida/

Another decent amp menu will greet your browser at this site. There is some basic English commentary and matching circuits, but the best part of these pages is a link to www.nora.to/VT/, which is a large library of specs and pictures for valves rare as well as common.

BISCUIT BOX
http://plaza28.mbn.or.jp/~6bm8/index.html

Not the name of the site, but one of its more entertaining inhabitants. Mr. Tamura and Mr. Uda have established a small DIY audio club where brief English explanations outline a couple of amps and circuits, with a 6BM8 design built into a biscuit tin.

We welcome any tips and links from readers who've been impressed by the audio credentials of the pages they've visited (e-mails to jon_beardy@yahoo.com)
Gary Devon reviews a book by on sound and hi-fidelity, written by Alvis J. Evans.

This concise little book, written by Alvis J. Evans, is an overview of what sound is, as well as a general guide to sound recording and reproduction technology. Mr. Evans is a lecturer and author in the electronics field, based in the U.S.

The book comprises 9 chapters, the first of which introduces the basic concepts of sound itself, such as sound pressure level and how tones relate to frequency. This leads to the introduction of what a stereo system does and how it works.

Chapter 2 gets more into hi-fi hardware, discussing amplifiers and how they work. Active devices such as FETs and Bipolar transistors are introduced, but in a simple way. There is a very basic discussion on the various amplifier topologies such as complementary output stages and the various classes of operation.

Chapter 3 covers distortion in its many and varied forms. Harmonic distortion is covered well with various diagrams relating a device's transfer characteristic to the generation of distortion. There is also a small piece on how harmonic and intermodulation distortion affects sound. The other main type of distortion is that of limited frequency response and associated phase response and this too is covered.

Chapter 4 covers the various sonic transducers used in recording and reproduction. Of course this is a very wide ranging subject and the coverage in this book is limited. However, the basics of how microphones and loudspeakers work is here. There is also a little on tape recording and CD replay mechanisms and how they work.

Chapter 5, entitled New Sound Concepts covers the various gizmos and gadgets used in the recording studio and what they are used for. For example compressors and expanders plus the various forms of frequency equalisation. Towards the end of the chapter there is a discussion on how sounds are electronically synthesised.

Chapter 6 gets a bit more meaty as the essentials of recording and reproduction are brought in. The largest chunks are about CD and digital recording, which is most relevant today. The advantages and pitfalls of digital recording are discussed in a practical way without becoming overly technical.

Chapter 7 is all about noise. The basic electronic principles are covered in a concise way. As with the rest of the book the relevant equations are explained in a no-nonsense fashion.

Chapter 8 covers the principles of radio transmission and reception and is quite comprehensive. How a signal is used to modulate a carrier and then how it is detected and the receiving end is given a good treatment. There isn't too much mathematics but the concepts involved do require some prior mathematical and electronic knowledge.

The same applies to the final chapter, entitled Video and TV Stereo. Here the concepts of transmission and reception are expanded into the AV arena. Finally there is a short appendix and glossary.

Making Sense of Sound is a compact introduction to audio technology in all its forms. It seems to be aimed at someone who already has some understanding of basic mathematical principles. The mathematics used in the equations is far from mind boggling but as the book is short at 108 pages there isn't much space to be led by the hand. If you want a handy no nonsense introduction to modern audio techniques this book would be a good place to start.
Nick Lucas looks at the new World Audio Design Bulletin Board

I want to introduce you to the wonderful world of the internet Bulletin Board and Chatroom. It's an internet letters page that allows people to communicate with each other, world-wide of course. We have started one on our website - www.worldaudiodesign.co.uk.

It is meant primarily for WAD kit builders to communicate with each other, but chat rooms are an open forum when unmoderated, like ours.

Our chatroom is simple and free to use. Ask questions or engage in discussion about your concerns. Our room is a live and informative place where 30 days worth of conversations are stored online. All you have to do is click on the "Bulletin Board" icon on the home page to find this page.

If you wish to pose a question, enter "Post Message". The open message will sit on the site and likely attract an answer. The next time you enter, login and use the "Find" facility to locate responses to your inquiry.

You can also enter the "Chat" pages and have a live chat to anybody else who is there at the time.

To demonstrate this communication I have lifted some interesting strands for your perusal.

I registered onto the chatroom, Paulo Pieroni, Oct 02, 2000, 16:29 posted:

"Hi Nick,
Good of you to sound us out on this. I'd like to see some of the following ideas:
Valves/solid state hybrid power amp. Sort of triode/FET thing.
Could you build it? Absolutely no problem at all. Just take your time. If you are line level only, i.e. no vinyl, KIT88 is wonderful. KEL34 or KIT88 are the easiest to build as they are both a case of soldering components by numbers then coloured leads to the board. The other power amps are hard wired with components on tag boards. Easy enough if you've some experience. The trickiest part is the input wiring. I've built both. They took far longer than anyone else that writing has admitted to!

Alternatively go for the luxury of 2 or 3 irons, I use 18W with a tiny tip, 25W with standard and 40W with chisel depending on the job. They strip everything including the input wiring. I've built both. They are good on these. Something like WGO20 no. GW26 at £59.99 inc. would be good. I've had an earlier version for years and it's both excellent and easy to use. Their Universal Cable Strippers MC5 £7.99 inc. look gimmicky until you try them. You can also use them to strip the end arm yourself with some-thing like KEL80, KEL34 or KIT88 are the easiest to build as they are both a case of soldering components by numbers then coloured leads to the board.

The other power amps are hard wired with components on tag boards. Easy enough if you've some experience. The trickiest part is the input wiring. I've built both. They took far longer than anyone else was admitted to!

Take your time. If you are line level only, i.e. no vinyl, KIT88 is wonderful. KEL34 is way ahead of the likes of Quad33/405, Audiolab, Pioneer A400 etc. but cannot match the sheer refinement of KIT88. Buy it with valves and build totally standard if you think you may want to tweak later. That way you've got a working starting point. If you are of a controlled disposition, unlike me, culminating in, for me at least, the KIT/KaT88.

Re: Can I build it? — Jiten Tolia
Posted by Jiten Tolia, Oct 03, 2000, 21:41
I am interested in building one of the amplifiers. I have modest "A" level knowledge of electrics, good manipulative skills (consultant ophthalmic surgeon) and don't want to irritate my hands (reason see above!). I could buy one but it would not be as much fun. At the same time I don't want to throw away hard earned cash on an uncompleted project. If buildable, which would be the best to try?

Many thanks.
Jiten.

Re : Can I build it? — Jiten Tolia
Posted by Richard, Oct 03, 2000, 23:47
Hi Jiten,
Could you build it? Absolutely no problem at all. The only skill you may not have and which you may want to practice first is soldering. To this end arm yourself with something like a 25W Antex iron from the Maplin catalogue No. FR12 £13.99 inc., but buy a smaller tip with it. The reasoning is that you will need the heat reserves of a larger iron for wires and valve sockets but the ability to control it for the smaller components.

Alternatively go for the luxury of 2 or 3 irons, I use 18W with a tiny tip, 25W with standard and 40W with chisel depending on the job.

Also treat yourself to a decent digital multimeter. Again, Maplins are good on these. Something like WGO20 no. GW26 at £59.99 inc. would be good. I've had an earlier version for years and it's both excellent and easy to use. Their Universal Cable Strippers MC5 £7.99 inc. look gimmicky until you try them. They strip everything including the input wiring and would keep your hands away from a craft knife. KEL34 or KIT88 are the easiest to build as they are both a case of soldering components by numbers then coloured leads to the board.

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World Radio History
Hi Nick and All,

I've had my KT88 up and running for the last 2 months and thought I'd drop you a line to say thanks. It really is superb. I had KEL34 for over a year and was so pleased with it that I was a little doubtful about changing. I shouldn't have worried though. Sufficient to say that KEL34 now has a new owner who took one listen, had a quick look under the bonnet, and bought it on the spot. I'm sure he'll be as happy as I was.

One of the nice things about building KT88 was that I was able to incorporate a few things I had learned with KEL34. Anyone considering a build might be interested in my experiences and subjective comments.

Cabling up the inputs is the longest and most tedious part of the build. The supplied cable does the job but this twin core with overall screen allows cross-talk between the channels. (Unplug one CD input then listen to the disconnected speaker if you want to hear this.)

Stereo imaging is formed by two separate signals. Mixing these signals leads ultimately to mono sound reproduction. To prevent this I used individually screened single cable for all inputs. Nothing fancy - there are a lot of cables and you'll struggle with anything over 3mm diameter - but RG316 is low capacitance, physically strong, and easy to work with. Maplin's XR13 is similar.

At the same time consider the volume pot. The supplied carbon pot is warm and full bodied but a little coarse sounding and lacking fine detail. I tried a £2.00 low noise plastic film type. It was horrible, flat lifeless and a little thin on first hearing - the Alps is warmer sounding. Once I became accustomed to it I had no thoughts of changing back.

On the board I went for Audio Note paper-in-oil coupling capacitors. These are huge so slip some plastic sleeving over the leads and hang them clear of the board. They also sound awful for the first few hours and then seem to keep getting better all the time. They are singing now and really open and detailed but not harsh.

Hi.

I take note of your own experiences and subjective comments. I made up KIT88 a few months and am interested. The Svetlanas are both uncompressed and sweet - loads of detail but they may suit some listeners but I found them uneasy and somewhat lightweight sounding.

The chosen valves make the biggest difference to the overall sound. I have listened at length to the supplied ones and many new 'old stock' types. My favourite 6N6 jr is the Sylvania 6AJ1 - super sharp and open, but not sibilant. It is in the same quality league as the MB136 but sonorously balanced to the other extreme and may well suit some systems. These preferences were arrived at with KEL34 and confirmed with KT88.

I'm still saving up to try a few different output valves for KT88! Here I hold my hand up and say that having tried the Tesla E34L in my KEL34 amp I wasn't impressed - a bit flat with a small soundstage. So, although I know Tesla's KT88 is a completely different valve, for right or wrong I decided to try the GE6550A for KT88. The completed amp has a huge soundstage. It is open and lively but not at all harsh. Just occasionally, on certain tracks, a voice sounds real - I mean REAL - my eyes flick to the point of origin and the hairs stand up on the back of my neck. After 20 years the hi-fi carrot still dangles!

A note on valve plate dissipation would not go amiss for anyone wanting to use other than the 35W rated TESLAs. As worked out with your good self, changing the cathode resistors from 150R to 220R will set the valves to dissipate around 32W and allow the use of any standard rated KT88 or 6550 types.

If you're still reading, sources are Pioneer PD91 CD and F91 tuner. Speakers are Chris Rogers Pro9TL transmission lines, tri-wired with separate crossovers hard wired in 6 boxes outside the cabs with Solen caps.

Please feel free to call in any time you are up this way and have a listen, 8 May 2000

rjmaile@aol.com

If you want to get a view of how a kit sounds then the Bulletin Board can again help:

KaT88 Power Amp kit

Posted by John Morgan, Aug 18, 2000, 10:37

I will be making up the KaT88 power amp kit. Has anyone made this kit and what does it sound like?

Re: KaT88 Power Amp kit — John Morgan

Posted by Hugo Cass , Aug 20, 2000, 1:24

Post Reply

Top of thread Forum

I too am interested in the KaT88, following very good experiences with the KEL34, to which it is related. Like the KEL34, I assume that the KaT88 responds to tweaking, and substituting audiophile parts at the very beginning is probably a good idea (see KEL34 upgrade article in HFW). The kit is easy to make, provided that you are calm, organised
diy letters

Dear Sirs,

The DIY letters section of Hi-Fi World is well-structured and generally clear. My amp worked fine from first fire-up, which did surprise me, but provided that you double-check every component before soldering, I don't suppose that anyone would have great problems.

If the KaT88 is at least as good as the KEL34, then it's got to be a winner. I've played around with different valves on mine, after failures in both types of the El valves supplied - I now use NOS RCA 6AU6s with NOS Telefunken ECC82s. The JJ power tubes have been fine, so the KT88s supplied with the KaT88 should be too.

In summary, get the kit, build it with core, and enjoy it. You won't get better value for money anywhere else, and if you like tweaking, there are hours of further fun to be had, which take the sonic performance much, much further.

You can use the Bulletin board for speaker stuff too. Note that one of its facilities is the ability to add links to other interesting sites. Just type in the website address and a link is automatically created.

KLS9 Ports
Posted by Paul, Sep 09, 2000, 12:13

I have been reading the June '97 Hi-Fi World Supplement re: tuning KLAS-9 ports and it gives three alternatives:

1. Short - 8 cm dia. x 19mm long
2. Ideal - 6.6 cm dia. x 6 cm long
3. Long - 6.6 cm dia. x 19cm long

And in a web article I obtained in 1997 from the site the port was 6 to 8 cm dia.

My question is that the latest article I got on the web says 8 cm dia., has anyone found it to be unsuitable, or should I go ahead with this size, and what length? Thanks.

Paul

Re : KLS9 Ports — Paul
Posted by Hapien, Sep 11, 2000, 12:26

Hello!

I also have KLS9 speakers under work. I'm going to use 50 litres enclosure tuned with port 7cm diameter and 11 cm length. It's hopefully going to provide somewhat flat response down to 42Hz (-3dB). WinISD is a nice freeware that is very useful with enclosure calculations. Related link: www.linearteam.org/winsd.html (WinISD)

Or for assistance in fault finding.

KLPP1 faulty
Posted by Archie Hunter, Sep 19, 2000, 14:27

Anyone able to help me. I built it O.K. but now it's broke I can't fix it! It's about 2 years old and has worked fine until now. On switch on I get a VERY LOUD cracking on the right channel only, after about 30 seconds the cracking reduces to just loud. Volume and source selector have no affect, and I have swapped the left and right valves again no affect. HEEEEEEEELP!

Here's Archie's response to replies

Re : Re: KLPP1 faulty
Posted by Archie Hunter, Sep 26, 2000, 14:22

Hi John. Thanks for your help. I have managed to trace the problem to the Anode resistor which was actually open circuit! I am back listening to music again. Only problem is I have discovered another problem which is only on the Phono line, it is a crackle on both channels which gets louder as the volume is turned up. From your previous advice it looks like I could have a problem on the power supply to the Phono section. Again thanks for your help and I will let you know how I get on.

Regards,

Archie

Or maybe you need to find something.

Nakamichi
Posted by Bob Beckman, Aug 25, 2000, 06:53 Post Reply Forum

Is there anyone out there who knows where I can obtain a repair on a Nakamichi 700ZXL cassette recorder? I am also looking for a Nakamichi Dragon 7 disc CD player. I believe Nakamichi manufactured a high-end CD transport with companion DAC at one time. I would like to obtain whatever information is available on these units. I am a Nakamichi collector.

Re : Nakamichi — Bob Beckman
Posted by Paul Blackman, Sep 05, 2000, 21:18 Post Reply Top of thread Forum

My Nak was repaired by Nakamichi service 01903 695695 very satisfactorily.

More info. on www.naks.com

As you can see the chatroom acts as an internet telephone exchange connecting all DIY people together in a very live and helpful way. It's great to know there are thousands of enthusiasts like yourself around the world and it's good to meet them. Just go to:

www.worldaudiodesign.co.uk

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