HI-FI WORLD SUPPLEMENT

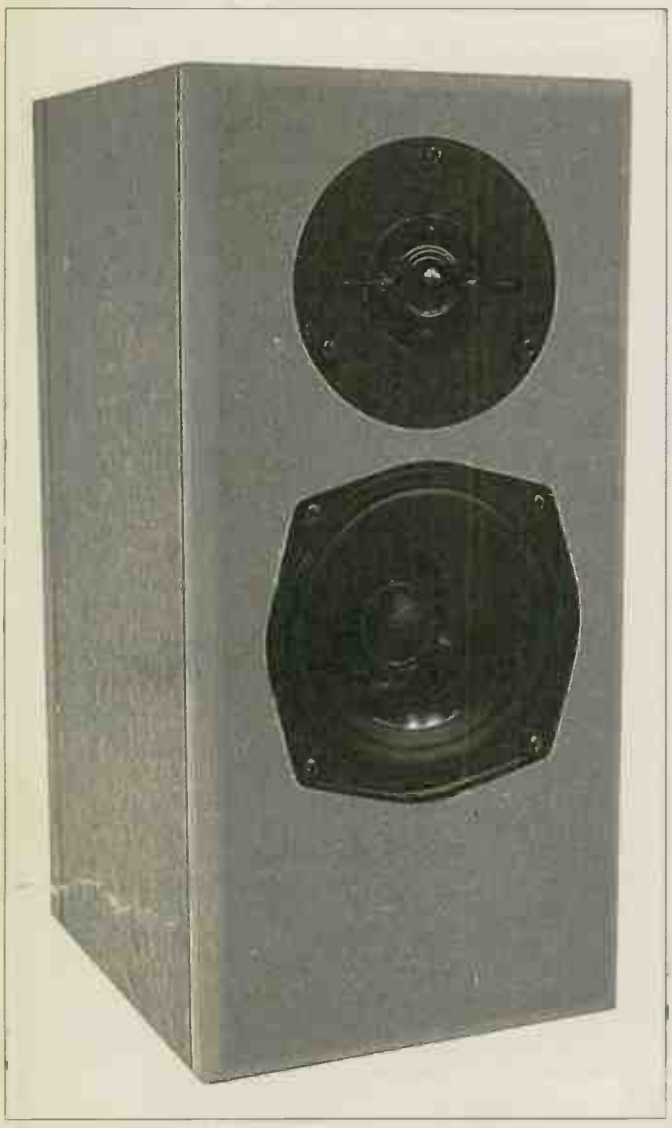
No. 8 JUNE 1994

BOOK REVIEWS

LETTERS AND Q&A

THIRTEEN BASS UNITS TESTED

BUILD A NOVELTY LAMP USING THE 211 VALVE



SPECIAL COMPENSATED PASSIVE PRE-AMPLIFIER

WE BUILD THE SPEAKER CO.'s 101 MINI MONITOR

FREE D.I.Y. SUPPLEMENT No. 8

Chelmer Valve Company for Audio Valves

Audio valves with famous Brand Names of yesteryear such as MULLARD, MOV, GEC, RCA etc., are in very limited supply and their scarcity also makes them very expensive.

We at Chelmer Valve Company however provide high quality alternatives to these old makes. We have over 30 years experience in the supply of electronic valves of all types and during this time have establshed close ties with factories and sources worldwide.

For high fidelity use we further process valves from these sources using our specially developed facilities. After rigorous testing - including noise, hum, microphony, post burn-in selection and matching as needed - we offer this product as CVC PREMIUM valves.

A selection of the more popular types is listed here.

Price list & Order Form for CVC PREMIUM Audio Valves

	UNIT PRICE	QTY.	TOTAL PRICE
PRE-AMP VALVES			
ECC81/12AST7	5.00		
ECC82/12AU7	4.00		
ECC83/12AX7	5.00		
ECC85	4.00		
ECC88	5.00		
EF86	4.00		
E81CC (GOLD PIN)	6.00		
E82CC (GOLD PIN)	6.00		
E83CC (GOLD PIN)	6.00		
E88CC (GOLD PIN)	7.00		
E80F	9.00		
E83F	5.50		
6SL7GT	4.00		
6SN7GT	4.20		
6922	5.00		
POWER VALVES			
2A3 (4PIN)	14.00		
2A3 (OCTAL)	14.00		
211	22.00		
300B	50.50		
811A	9.50		
845	29.90		
EL34/6CA7	7.50		
EL84/6BQ5	4.00		
E84L/7189A	5.10		
KT66	9.20		
KT88	12.50		
KT88 (GOLDQ)	18.50		
6L6GC	6.50		
6L6WGC/5881	8.00		
6V6GT	5.00		
6146B	10.20		
6336A	30.00		
6550A	11.00		
6550-A	13.50		
7581A	11.00		
TOTAL CARRIED FORWARD.....			

	UNIT PRICE	QTY.	TOTAL PRICE
CARRIED FORWARD....			
RECTIFIERS			
GZ33	4.50		
GZ34/5AR4	4.50		
5U4G	5.00		
5Y3GT	3.20		
5Z4GT	3.50		
SOCKETS			
B9A (PCB)	1.60		
B9A (CHASSIS)	1.60		
OCTAL (CHASSIS)	1.75		
4 PIN (UX4)	3.00		
4 PIN (FOR 211 & 845)	11.00		

MATCHING CHARGES * .....
POST & PACKING ..... 3.00 (UK)

TOTAL EXC. VAT .....

VAT @ 17½% (ECC) .....

TOTAL TO PAY ..... £

* MATCHING, if required; state valve types & if PAIRS, QUADS or OCTETS - Allow £1.00 per valve for this service.

Make CHEQUES payable to:
'CHELMER VALVE COMPANY or pay by
ACCESS/MASTERCARD/VISA, give details:

Signature ..... Expiry .....

Name .....

Address .....

..... Post Code .....

Valves amplifiers sound better still with CVC PREMIUM valves!

130 New London Road. Chelmsford. Essex CM2 ORG, England. Telephone: (0245) 355296/265865 Fax: (0245) 490064

D.I.Y. Supplement

Contents

HALCYON ELECTRONICS

Test equipment, video monitors, amateur radio gear, printers, power supplies, communications, disk drives, multimeters, oscilloscopes, scientific instruments, connectors, component bridges, frequency counters, signal generators, computers.

QUAD 303 STEREO POWER AMPLIFIERS	£95	PENNY & GILES FADERS 1110D & D21903/1	£6
DAWE 1405D SOUND LEVEL METER 130DB(A)	£95	AVO MULTI-MINOR MK5 (1 ONLY)	£49
"ANTIQUE" WOODEN BOX TEST EQUIPMENT FOR CALLERS. HT PSU 0-500V 350MA 6.3V 10A	£85	CONSTANT VOLTAGE TRANSFORMERS .15-2KW	POA
CITOH CX6000 A4 PLOTTER 6 PEN CENT/RS232	£135	COMARC 2303 MV SOURCES, DUAL RANGE	£49
TETRONIX 4662 A3 PLOTTER 1-PEN GPIB/RS232	£175	MARCONI TF1370A LF OSC 10Hz - MHz SIN/SQ	£49
130VA TORROIDAL TRANSFORMERS, UNIVERSAL PRIMARIES, 2x 18V SECONDARIES	£11.75	MARCONI TF2331 DISTORTION FACTOR METER	£175
50VA TORROIDAL TRANSFORMERS, UNIVERSAL PRIMARIES, 2x 20V SECONDARIES	£9.75	MARCONI TF2337A AUTO DISTORTION METER	£195
PAPER BLOCK CAPACITORS, VARIOUS		MARCONI TF2343 QUANTIZATION DISTORTION METER	£49
HI-VOLTAGE ELECTROLYTICS		MICRO/MILLIVOLT METERS	FROM £17.50
RESISTORS, CONNECTORS LEADS, SWITCHES, RELAYS ETC		SIGNAL GENERATORS, VARIOUS, 1Hz - 1GHz, SINE/SQUARE/TRIANGLE, ETC	FROM £19
C&R OECADE BOXES	FROM £15	TRANSISTOR TESTERS	FROM £19
SAFEBLOCS	£11.50	FREQUENCY COUNTERS	FROM £49
INSTRUMENT CASES/RACKS, VARIOUS	POA	AVO 8MK5 MULTIMETERS	£85
LEADER LBO-9C ALIGNMENT SCOPE 2mV/10kHz	£249	AVO 8MK6MULTIMETERS	£99
DYNAMMCO O7100 SINGLE TRACE 10MHz SCOOP WITH LINE FINDING & PICTURE MONITOR FACILITIES	£99	GOERZ 3N MULTIMETERS	£79
SCOPEX 4S6 6MHz SINGLE TRACE	£95	INSULATION TESTERS	FROM £44
TEKRONIX 2215 60MHz 2 TRACE DEL T/B	£450	BENCH DIGITAL MULTIMETERS	FROM £129
TEKTRONIX 453A 50MHz 2 TRACE DEL T/B	£249	600 & 75 OHM ATTENUATORS	FROM £15
H.P 8405A VECTOR V/METER 1GHz	£595	BEAT FREQUENCY OSCILLATORS	POA
TELEQUIPMENT D61A 10MHz DUAL TRACE	FROM £99	PM6456 FM STEREO GENERATOR	£175
SELABS SM111 18NHz DUAL TRACE	£129	CARDIAC RECORDERS LTD MINIGRAPH TYPE 123	POA
TELEQUIPMENT D67A 25MHz 2T. DEL T/B	£215	GOULD 2400 4-PEN CHART RECORDER	£195
H.P 1700A 35MHZ DUAL TRACE	£249	X-Y-RECORDERS A3 & A4 FROM	£35 - £139
HITACHI VC 8015 10MHz DIGITAL STORAGE	£345	7SEG 12" &9" DISPLAYS DIGITEX/SIGNALEX	£15 & £10
H.P 1340 X.Y DISPLAY	£149	MARCONI TF2300 FMAM MODULATION METER	£195
OERTLING V20 SINGLE PAN BALANCES IMG - 200G	£69	MCKENZE 7 DAY TEMP/HUMDITY RECORDER	£95
ANALYTICAL BALANCES WITH WEIGHTS 250GM	£69	FEEDBACK SS0603 1MHZ SINE/SQ OSC	£125
VACUUM PUMPS 1.5 & 28CU.M/HR	£125 & £149	COMMUNICATIONS RECEIVERS VARIOUS	POA
KINGSHILL NS 1540 15V PSU'S CASED AS NEW	£195	WAYNE KERR CT492 LCR BRIDGE	£79
ACRON 402P SYNCHRROISING PULSE GEN & 605P ENCODER	£375EA £595/PR	AVO B151 LCR & Q BRIOGE	£195
RADIOMETER BKF6 DIST. METER 20Hz - 20KHz	POA	MARCONI TF2701 LCR BRIDGE	£125
MAROONI TF2330 WAVE ANALYSER 20Hz - 50KHz	£149	MARCONI TF2700 LCR BRIDGE	£195
H.P 5315A 1GHz F/CTR, OPTS 1,2&3	£595	MARCONI TF1313 LCR BRIDGE 0.25%	£95
LYONS D10 DISTORTION METER	£95	AVO CZ457/S COMPONENT COMPARATOR LCR	£95
		LEVEL TM68 MICRO V-METER 450MHz	£95
		LEVEL TM38 MICRO V-METER 3MHz	£85

LIST AVAILABLE 1000'S OF UNLISTED BARGAINS FOR CALLERS. ALL PRICES EXC. OF P&P AND VAT. QUALITY ELECTRONICS EQUIPMENT ALWAYS WANTED

HALCYON ELECTRONICS
423, KINGSTON ROAD, WIMBLEDON CHASE, LONDON SW20 8JR
SHOP HOURS 9 - 5.30 MON-SAT. TEL 081-542 6383. FAX 081-542 0340

VISA

BIE Billington Export Limited

1E Gillmans Trading Estate, Billinghurst, Sussex RH14 9EZ UK
Telephone: (0403) 784961
Fax: (0403) 783519

TOP QUALITY AUDIO TUBES from West Europe/USA. We have 1 million valves/tubes in stock including vintage and high quality audio types. Please enquire for any type not listed below.

2A3 Chiltese	£15.16	ECC82 Mullard UK	£4.85
5AR4, refer to GZ34/GZ37		ECC83 Russian	£2.75
5C-45DA	£295.00	ECC85 Tungstram	£2.66
5R4GY,RCA	£4.98	ECC88 Russian	£3.32
5U4G W European	£7.99	ECC88 Mullard UK	£5.51
5Y3WGTA Sylvana	£3.99	ECL82	£2.59
6AS7G Russian	£4.38	ECL86 Mullard	£4.38
6B4G American	£33.25	EF86 GEC UK CV4085	£14.63
BH6 RCA	£2.19	EF86 Russian	£3.45
6C33CB Russian	£23.70	EF804S AEG	£25.00
6CD7 Mazda	£4.32	EL34 Chinese Billington	£7.96
6DJ8,refer to ECC88		EL84 Mullard	£9.30
6L6GC GE USA	£14.63	EL84 Tungsram	£3.05
6L6GC Russian 5881	£4.65	EL84 GE USA	£3.92
6L6GC ECG Philips	£18.62	EL519 Russian	£9.24
6SL7GT STC UK	£5.98	GZ32 Mullard UK	£8.37
6SN7GT STC UK	£6.58	GZ34 Mullard UK	£12.00
6V6GT STC UK	£3.45	GZ34 Genuine Russian	£5.98
6X4 UK MOD	£2.39	GZ37/CV378 Mullard	£4.39
12AT7, refer to CV4024/ECC81		KT66/7581A GE	£15.89
12AT7WC Sylvania	£3.92	KT88 Chinese Billington	£13.96
12AU7,refer to ECC82		KT88, refer to 6550A GE	
12AX7WA Russian	£2.75	M8136, refer to CV4003/ECC82	
12AX7WA ECG Philips	£9.99	M8137, refer to CV4004/ECC83	
12BH7A Sylvania/RCA	£10.97	M8162, refer to CV4024/ECC81	
12E1 STC ITT UK	£13.30	ECC83 China	£1.75
13D3 CV 4068	£5.99	Mu14 Brimar UK	£3.99
13E1 STC UK	£133.00	PL519 Sylvania USA	£7.91
85A2 Mullard	£5.98	VT4C GE	£42.56
211GE	£42.56	SOCKETS	
3008 Chinese	£53.13	UX4, used for types 2A3/300B etc	£2.32
805 United USA	£33.25	VT4C/211 ceramic	£14.36
807 RCA	9.29	B5	£3.99
811A Russian	£10.40	UX5 McMurdo	£1.85
845 Chinese	£36.00	B7A Teflon, used for types 6C33CB etc	£1.89
4212e STC UK	£120.00	B7G McMurdo UK, chassis mounted and skirted	£0.63
5687 USA	£5.99	Octal MicMurdo Chasses	£0.86
5751 USA	£8.50	Octal PCB	£2.99
5881/6L6WGB Russian	£4.25	B9A chassis unskirted	£0.69
6189 Mazda	£5.99	B9A chassis skirted	£0.79
6201, refer to CV4024		B9B gold pins	£1.73
6922 Sovteck	£4.30	Topcap for 807	£2.66
6550 Sovteck	£12.00	Topcap for 58-254-234M,12E1,PL519 etc	£2.66
6550 Chinese	£12.36		
6550A GE USA1991	£29.00	We can supply sockets for any valve listed in this advertisement	
CV4003 Mullard	£7.31		
CV4004 Mullard	£15.53	For matched pairs please pay add £2.00 per valve	
CV4024 Mullard UK	£7.65	All items tested prior to dispatch, very good quality and garuantee for 60 days	
CV4085, refer to EF86		Postage and packing £3.00 per order to UK. Please allow 7 days plus postal time for delivery.	
DG7-32 Tungsrum	£26.80	Payment with order please (cheque, telex, Visa, Mastercard, American Express accepted)	
E82CC, refer to CV4003			
E83CC, refer to 12AX7WA			
ECC91 Brimar UK	£3.12		

BILLINGTON EXPORT LIMITED *1E Gillmans Trading Estate, Billinghurst, W. Sussex RH14 9EZ UK Telephone: (0403) 784961 Fax: (0403) 783519*

MINIMUM ORDER - UK £5.00+17.5% V.A.T. EXPORT £100.00 Callers strictly by appointment only

Order over £400 (mix of types is ok) qualify for 25% discount
After 31st March 1994 these prices are subject to review. Please confirm before ordering.

WOLLATON A•U•D•I•O

XLO FOR THE HOME CONSTRUCTOR

Whether you are building equipment from scratch, or upgrading existing equipment then XLO wiring will improve the performance. Also available are the XLO chassis mount phono and the XLR connectors, and the speaker binding posts.

Cables and wires.

PRO 100 interconnect	£5.50 per foot
PRO PL1000 mains cable	£12.00 per foot
REF PL10 main cable	£25.00 per foot
PRO 16P* Chassis hook up wire	£1.00 per foot
REF 16T* Chassis hook up wire	£10.00 per foot

Connectors

Neutrik gold plated XLR male	£6.00
Neutrik gold plated XLR female	£7.00
XLO pro phono plugs (4 pack)	£25.00
XLO ref phono plugs (4 pack)	£44.00
XLO spade plugs (4 pack)	£13.00
XLO Signature XLR chassis mount (2 pack)	£28.00
XLO Signature XLR chassis mount	£28.00
XLO BNC connectors (2 pack)	£16.00

* Note that the chassis wire is excellent for loudspeakers internal wiring or to replace the jumper connectors used when Bi-wire speakers are used in single wire mode. When using the wire to carry signals of less that 100hz a double run should be used. High quality preamps should be wired with 16T.

WOLLATON AUDIO - TEL/FAX: 0602 284147

SOWTER TRANSFORMERS

Sowter Transformers have been used by the Professional Audio Market throughout the world for at least the last twenty - five years.

Using modern technology and Computer Aided Design we are now able to offer a complete design and manufacture service.

Our current lists show a range of over 50 output, 70 power transformers and nearly 30 chokes.

E. A. SOWTER LTD
P.O. BOX 36, Ipswich IP1 2EL
Tel: 0473 252794. Fax: 0473 236188 SEND S. A. E. FOR DETAILS.

---

triode valve amplifiers

preamplifiers, single ended power amplifiers

designs, components, transformers

For further information and a catalogue send an SSAE to:

sjs electroacoustics

Ben-Dor, Lumb Carr Rd, Holcombe, Bury, BL8 4NN.

KIT *NEWS*

AUDIOPHILE CATALOGUE

RATA have just finished their new Audiophile Catalogue, full of high quality components and products for the DIYer and hi-fi enthusiast.

As well as their high performance hi-fi equipment, RATA offer a large range of specialist components. These include: Vishay and Holco resistors, Sfernice potentiometers, Ansar and Suflex capacitors, transformers, drive units, valves and more.

For your copy of the latest RATA catalogue, 'phone or write to:

RATA Ltd
Edge Bank House,
Skelsmergh,
Kendal,
Westmorland,
LA8 9AS.
Tel: 0539 823247

MAPLIN STRIP OFF

The new CW33L wire stripper for Maplin Electronics is a compact and unique cable stripper capable of removing both the inner and outer insulations of round cables up to 8.5mm cross section. Ideal for the home constructor, or professional electrician, it costs just £6.75.

Maplin electronics are also keen to make themselves more available to the general public, opening new shops in Stoke-on-Trent and Dudley recently.

Maplin Electronics,
P. O. Box 3,
Rayleigh,
Essex.
SS6 8LR
Tel: 0702 554161

A CATALOGUE OF KITS

The Speaker Co. have just finished updating their kit loudspeaker and drive unit catalogue, bursting with lots of new products. New drive units include the massively engineered Precision Devices bass drivers, Audax HDA units, and automotive speakers from Altec and Macrom.

There are also several new kits on the way. First to arrive should be the DTM1, a 2-way desk top monitor using twin 5inch bass units and a soft dome tweeter, both supplied by Morel. The Speaker Co. are also working on a small horn loudspeaker, using a 6.5inch bass unit, possibly the Audax HDA unit, although this design is at a very early stage. Also due sometime in the future is The Speaker Co.'s first subwoofer, using the dual voice coil Volt DVC 250 bass unit.

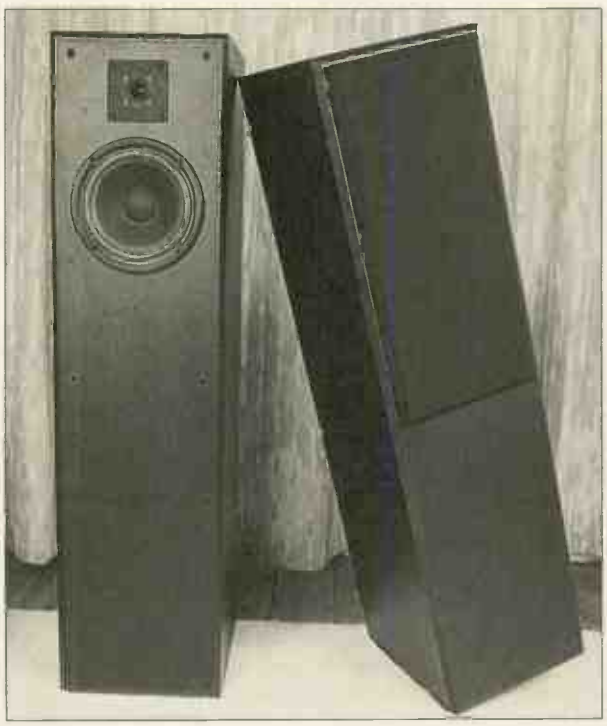
Also in the new catalogue are Ansar Supersound polypropylene capacitors and high value E-core inductors which have a lower DC resistance than standard inductors. For your copy of the new Speaker Co catalogue, contact:

The Speaker Co,
Unit 9,
Waterside Mill,
Waterside,
Macclesfield,
Cheshire.
SK11 7HG
Tel: 0625 500507

AUDIOJUMBLE

The second Audiojumble, organised by John Howes, is due to take place on Sunday 17th July at the Royal Victoria Hall, Southborough, Tunbridge Wells, Kent. A wide range of vintage and modern hi-fi equipment will be on sale, so if you've always fancied restoring a piece of vintage esoterica, or even just browsing for interesting books and gadgets, pop along and have a look. Admission is £1, and if you're interested in taking a stall, the cost is £15. For all enquiries,

Tel: 0892 540022



TABULA RASA EXPAND

Tabula Rasa have been hard at work expanding and diversifying. They have just launched a range of loudspeaker stands to complement their loudspeaker kits, and equipment racks are to follow shortly.

Following the review of the floorstanding CT77s in our October' 93 DIY Supplement, Tabular Rasa report an excellent response, so much so, that they have reduced the price even further, it's now down from £295 to £280!

Within the next month or so, they will also be importing the beautifully styled and built Burmester range of hi-fi equipment, and audio components from Inter Technik who produce a wide range of inductors, foil capacitors and transformers.

Tabula Rasa
136 Kilnwood,
High Wycombe.
HP14 4UR
Tel: 0494 565116

300B PRODUCTION DEVELOPMENT COMPLETED

And now some news from us. Frustrated potential customers champing at the bit worldwide will be delighted, even amazed, that we have finally completed development of our 300B 30watt/ch. amplifier. It is now going into production as a kit.

The delay has been caused by numerous factors, including Chinese valve unreliability, which triggered a power supply re-design, an improvement of the input/driver stage to further reduce distortions and allow removal of tertiary feedback, improved driver transformers for wider bandwidth for substantial reduction of ringing, physical re-arrangement to lessen heat build up over extended periods.

And then there's been the subjective fine tuning, to select the capacitors, valves, and resistor makes/types and set values where possible (e.g. bypass caps).

The improvement in performance has been so great that 300B does not now need feedback of any sort, distortion has become so low. In other words, it has become an unusually linear amplifier - always the promise of the 300B valve, usually frustrated by transformer and/or circuit limitations. All the same, loop feedback can be applied by the flick of a switch; the amp. can be monoblocked as well to give around 60watts. We hope to be giving much more information on this project soon, which has become totally absorbing to us. **NK**

Building The 101 Monitor Loudspeaker

Dominic Baker tackles a quality mini monitor from The Speaker Co.

The LS3/5a is a loudspeaker familiar to most audiophiles. Onginally developed by the BBC in 1974, it is still going strong today, 20years later. Nowadays though, there are several pretenders, following the LS3/5a theme. Some use more modern drive units, up-rated crossovers and differently dimensioned boxes. The Speaker Co. have recently added their kit version to the market, based on the KEF 101 monitor, which, itself, was an LS3/5a pretender. They've added a little more volume to the box though, to get better bass, and used very heavy 30mm MDF, for an uncoloured midband.

The kit comes with high quality components throughout, including knurled gold plated terminals, Deflex damping pads, a pre-built KEF crossover and grilles. The instructions were clear and easy to follow, but this is a very simple kit to build anyway, so anyone who can use a soldering iron and drill should encounter few problems.

BUILDING THE KIT

Like the IPL S3 kit I built for the last supplement, The Speaker Co's 101 Monitor kit went together very easily. The wide rebated edges give plenty of room for the glue to be applied and should ensure that the box is airtight.

There is a little drilling to be done with this kit, to provide fixing holes for the drive units, input connector panel and grille fixings, but this only takes a few minutes and can be done with a small electric drill. Just small pilot holes are needed for the tweeter and input panel - self-tapping wood screws are used - but threaded 'T' nuts have to be hammered into the rear of the baffle for the bass unit.

The kit comes supplied with Deflex damping pads which replace the traditional carpet felt and long haired wool. It is best to cut the damping pad to size and glue it to the rear baffle before putting the cabinet together; it's much harder once the box has been built.

I glued the cabinets together, not forgetting to stick the pre-built KEF crossover board to the bottom surface; it was a quick process. Excess glue can be smoothed away easily with a damp cloth and the cabinet then held firm with carpet tape. Other wide tapes can be used, but carpet tape in particular has some stretch in it, which helps to pull the panels tightly together.

While the cabinets are drying the rest of the kit can be prepared. The latest addition to the Deflex range are small circular damping pads that are fixed to the rear of the magnet assemblies. The idea is to reduce reflections off the hard surface of the magnets.

Once the cabinet glue has dried the tape can be removed and the terminal panel and drive units mounted. If you want to apply a painted or veneered finish it is best done at this stage, since drive units and paint don't mix.

A small hole has to be cut through the Deflex damping to allow the wires from the crossover to be soldered to the terminal panel before it is screwed into place. The drive units are easily mounted, thanks to the 'T' nuts already in place, but care is needed in getting the wires the right way 'round.

The kits come complete with grilles which have to be assembled by the constructor. This is a relatively simple operation. The thin board which forms the crossover frame is placed over the cabinet, making sure it is straight. Four small (3mm) pilot holes are drilled through each corner of the grille frame and just into the surface of the cabinet. This ensures that the cups and studs that fix the grille in place will line up. The hole in the grille frame has to be widened out to 4.5mm and the one in the cabinet to 10mm to accept the fixings. The grille cloth can now be glued or stapled into place, finishing the loudspeaker.

The treble was quite sweet and avoided sharpness, even with Steve Earl's Copperhead Road which contains a lot of high frequency energy. It was a little bit relentless, smacking on the same note over and over again, but didn't disgrace itself. I did notice that there seemed to be a lack of really high treble, cymbals decayed a little too abruptly, but again this kept sharpness or grittiness at bay.

Basically, what you get with The Speaker Co's 101 Monitor is an LS3/5a with better bass, uncoloured midrange (thanks to the heavy cabinet and Deflex panels) and respected KEF drive unit engineering.

101 Monitor **£240**

The Speaker Company
Unit 9, Waterside Mill,
Waterside, Macclesfield,
Cheshire. SK11 7HG

SOUND QUALITY

The 101 Monitor kit is basically an LS3/5a with a little more bottom-end welly, thanks to the increased volume of The Speaker Co's cabinet. It still doesn't have real deep bass, like any small speaker, but what's there is firm and punchy, adding speed and dynamics to the bottom end; I found there was little sign of one-note bass. Overdriving them brings a crack from the bass unit as it hits its end stops. It sounds dramatic, but it is a deliberate design feature used to deter owners from over-driving, KEF told us some time ago.

Above the solid upper bass lies a soft midrange. It doesn't project as well as many more modern versions based on the LS3/5a theme do, but the heavy MDF cabinet ensures that it is not boxy. For example, John Lee Hooker didn't fill the room with quite the same larger-than-life image that some 'speakers produce, but his voice was clear and free from any artificial colouration contributed by the cabinet.

MEASURED PERFORMANCE

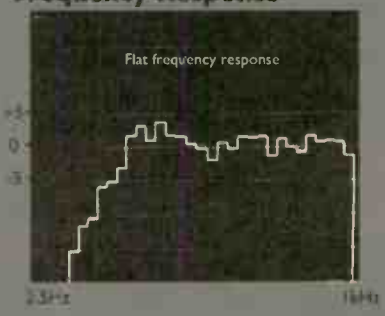
The frequency response of The Speaker Co. 101 monitor is, as you'd expect with the crossover being engineered by KEF, very smooth indeed. There is a little dip in the upper mid which explains the softness I heard, and a lift in the upper bass which will give the sound speed and punch. There isn't much low bass, but there's enough to give a balanced sound.

The impedance curve is very high indeed, giving an overall impedance of 17Ω! In consequence, the 101 monitors will not demand much current from an amplifier, but they aren't very sensitive either. Measured at 1m with a 2.8V pink noise audio band signal, it was a very low 81dB. This means that you'll need an amplifier that can supply a lot of volts, a good Japanese pre/power or beefy integrated being best at this.

Overall, The Speaker Co's 101 monitor is a well engineered loudspeaker. The combination of high impedance and low sensitivity is a little inconvenient, but shouldn't cause any modern transistor amplifier problems. **DB**

Impedance

Frequency Response



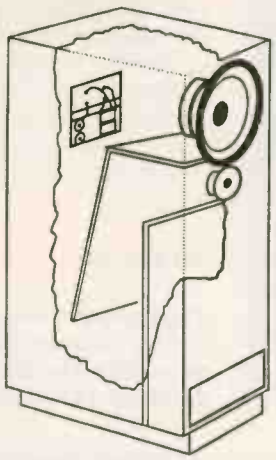
SPEAKER KITS FROM *IPL ACOUSTICS*

Over a 5 year period **I.P.L. Acoustics** have developed a range of high quality speaker kits, using the best units from SEAS, MOREL, AUDAX, VISATON and I.P.L. and have produced a comprehensive range of speakers which will compete with the most expensive of commercial designs. All speakers have BIWIRED crossover kits containing high quality components and terminals.

AS6 PANEL KIT

PLUS KIT.....£262.77
PANEL KIT.....£302.77

FOUR TRANSMISSION LINE KITS



TRANSMISSION LINE
PLUS KIT
£167.00 - £280.00

M3TL

PLUS KITS.....£167.00
TOTAL KIT.....£226.00

A2 RIBBON KIT

PLUS KIT.....£222.00
TOTAL KIT....£291.00

M2 MINI-MONITOR

PLUS KIT.....166.00

PRE-VENEERED CABINET NOW AVAILABLE. Carriage charge extra on all kits.

If you would like further details please send £1.50 for **36 PAGE SPEAKER BUILDING CATALOGUE**, comprising **VALUABLE ADVICE** on **DESIGNING, BUILDING** and **TESTING** speakers and full technical specifications including response curves of eight kits, drive units, and details of **SPECIALIST CABLES** and **ACCESSORIES**

I.P.L. Acoustics, 2 Laverton Road, Westbury, Wiltshire, BA13 3RS. Tel: 0373 823333

LANGREX SUPPLIES LTD

DISTRIBUTORS OF ELECTRONIC VALVES, TUBES AND SEMI-CONDUCTORS AND I.C.S.
1 MAYO ROAD • CROYDON • SURREY CR0 2QP
24 HOURS EXPRESS MAIL ORDER SERVICE ON STOCK ITEMS

PHONE 081 684 1166 **FAX** 081 684 3056

A selection of our stocks of **New Original Mullard - Brimar** audio types made in UK.

STANDARD TYPES			SPECIAL QUALITY TYPES			
ECC88	MULLARD	6.00	E88CC - GOLD PIN MULLARD			8.50
ECH81	MULLARD	3.00	ECC81 - M8162 / CV4024 MULLARD			6.00
ECL86	MULLARD	3.50	ECC81 - 6201 / GOLD PIN MULLARD			8.50
EF86	MULLARD	7.50	ECC82 - M8136 / CV4003 MULLARD			6.50
EL84	MULLARD	6.00	ECC83 - M8137 / CV4004 BRIMAR			6.50
GZ32	MULLARD	8.50	EF86 - M8195 / CV4085 G.E.C			10.00
GZ34	MULLARD	12.50	**AMERICAN TYPES GE.**			
6SL7GT	BRIMAR	4.50	6146B.G.E	15.00	6L6GC G.E	12.50
6SN7GT	BRIMAR	4.50	6550A.G.E	17.50	12AX7A G.E	7.00
6V6GT	BRIMAR	4.25	7581A.G.E	12.00	12BH7A G.E	6.50
					12BY7A G.E	7.00

OPEN TO CALLERS MON.-FRI. 9AM - 4PM. CLOSED SATURDAY
QUOTATIONS FOR ANY TYPES NOT LISTED.
OVER 6000 TYPES AVAILABLE FROM STOCK
OBSOLETE ITEMS A SPECIALITY
TERMS C W O/VISA/ACCESS ETC...
P&P 1-3 VALVES £1.00, 4-6 VALVES £2.00 ADD 17.5% VAT TO TOTAL INC P+P

VISA

Access

211 Bedside Lamp

(for sweet dreams)

Building a kit valve amplifier isn't that easy. You need to be able to solder neatly, follow circuit diagrams and have a fairly good understanding of electronics in general. But that doesn't mean that you can't build something with a glowing valve in it - and perhaps do a little dreaming. Here is a simple ornament or lamp - albeit a dim one - made using the bright emmiter 211/VT4C valve, found in exotic amplifiers such as the £43,000 Audionote Ongaku.

Our lamp is a bit more affordable than an Ongaku and the electronics knowledge required to build it is minimal, so almost anyone should be able to participate. The heaters of the 211 which give off the bright glow only need 10V, so a transformer is used to step-down the 240V mains voltage. But the 211 takes 3.25A of heater current, so a highly rated transformer must be used.

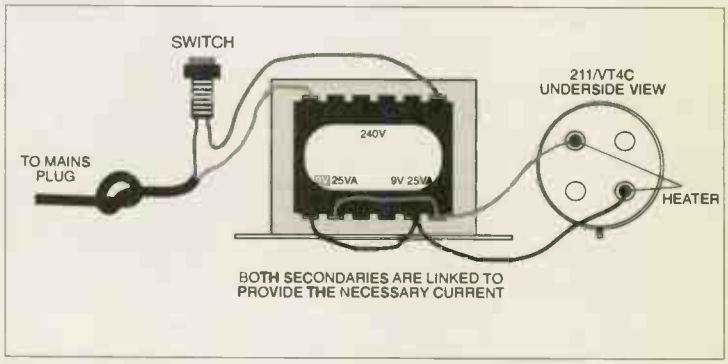
Most of the components needed came from Maplin, who produce an electronics mail order catalogue that can be found in W. H. Smith. The components for the lamp cost an affordable £15 or so and the 211 itself can be purchased from P.M. Components for £19.95, quite a lot for a light bulb, but then it'll last for many years and it's bit more unusual and evocative.

To build the 211 ornament you will need some solder, a soldering iron and the components listed at the bottom of the page. There is a schematic diagram to help you build it, showing exactly where each wire goes. Remember, don't touch anything unless the mains switch is turned off and the plug has been pulled out of the socket.

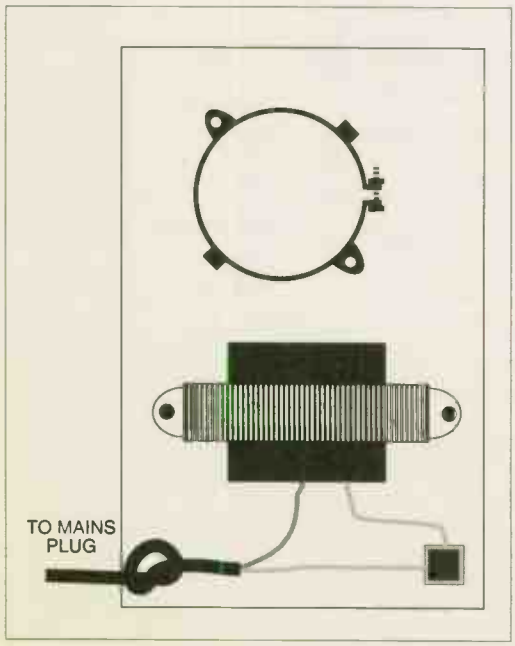
BUILDING THE 211/VT4C LAMP

Start by mounting all of the hardware on the ABS box. A 48mm diameter hole needs to be cut for the 211 to drop through, into the capacitor clip. I did this by first drilling a small pilot hole and then widening it out with a fine blade in a jig-saw. By screwing the valve into the capacitior clip, the fixing holes can be marked and drilled, and then the clip bolted in. The mounting hole for the switch can be drilled straight out using a 13mm bit, as can the one for the mains lead using a 5mm bit. The transformer is bolted to the bottom of the box, positioned to be half way between the valve base and the mains switch.

Once all the hardware has been fitted the components have to be soldered up. It is best to solder from the valve backwards, connecting the mains lead last. Solder two wires to the heater pins and then to the transformer as shown in the diagram. Wire the transformer to the switch and the mains, putting a knot in the mains lead to prevent it being pulled out of the box. Wire up a mains plug and then go back and check that you've made all the connections correctly. If you're sure that all is O.K. plug in and turn on. Hopefully you will now be sitting in front of a glowing 211/VT4C valve- and it won't have cost you £43,000 ●



Wiring diagram



Layout

LIST OF COMPONENTS FOR 211 LAMP

MAPLIN 0702 554161

DH30H	Transformer	£8.11
YW43W Red	Switch	75p
KC89W	ABS Box	£3.85
XR47B	2m Mains cable	2x20p
FW38R	4 Stick-on Feet	4x28p

ELECTROMAIL 0536 204555

543-046	45mm Cap Clip	24.6p+
		£2.95 p&p

Unfortunately, if you order from Electromail you have to order 5 clips and pay £2.95 for postage making £4.18, but most small electronics shops should be able to oblige for around 50p or so.

PM COMPONENTS 0474 560521

211/VT4C Valve	£19.50

AUDIO NOTE

AUDIO NOTE AUDIO COMPONENTS PARTS & PRICE LIST.

We have decided to offer a range of the ultra high quality components used in most of the Audio Note amplifiers to the discerning "do-it-yourself- valve amplifier enthusiast. These components include specially made valve bases. paper in oil signal capacitors, copper & silver foil signal capacitors, Black Gate graphite electrolytic capacitors, acid/corrosive-free silver solder, audio output transformers, valves and many other useful bits for upgrading old or constructing new valve amplifiers.

All prices are excluding Vat, which, if you live inside the EEC will be added to your purchase, after the addition of postage and packing costs.

We accept VISA, Mastercard, Access, Diners, and Amex. to pay this way, we will need your address, card no. with start and expiry dates, you can also pay by bankers draft, Eurocheque or cheques drawn on a UK bank account. Please note that there is a minimum charge on credit card transactions of £20.00.

Delivery is normally about 7 days from receipt of cleared funds, but please allow up to 60 days for some items, if not stock at the time or order.

If any of you reading this have possession of any books which contain information relevant to the subject of Audio Design and which would be useful to share with others, please let us know either by fax or telephone. There is an award of £20.00 (payable in valves or other bits, post free) to anybody who sends us a book which contains useful information about valve amplifier design or theory.

Circuits, Valve Data & Basic Technical Information.

If you would like some suggestions to base a future project around, then we shall be happy to provide you with a circuit pack containing good circuits like ONGAKU, KEGON/KASSAI, NEIRO, GAKU-ON plus several other power amplifier circuits and the M7Tube pre-amplifier, which is the best pre-amplifier circuit we have come across. Just send a stamped self addressed A4 size envelope, together with £5.00 in small denomination, or if you live outside the UK a US$ 15.00 in $ bills will do, please do not send International Response Coupons or International money orders, as they cost more to cash than their value.

We can also supply a set of data sheets for the most commonly used valves, ECC82, ECC88/ 6922, 12AY7/6072A 7025/12AX7WA/ECC83, 6SN7, 300B, 211VT4C, 845. EL34/6CA7, 2A3, 6X4, 5U4G, GZ34/5AR4, EL84/6BQ5, 6V6GT, 6L6G, 5881/6L6WGC/KT66. Again send a stamped self addressed A4 envelope together with £4.00 in small denomination stamps or if outside the UK another US$ 10.00 will suffice.

Since nothing really exists which gives a reasonable background to the subject of valve amplifier circuit design, Guy Adams and I have written and assembled a number of articles and extracts from old books which give some background to the subject, do not expect to become an instant expert, but it will serve as a useful reference, for the beginner as well as the more advanced, we have expanded this info-pack to include even more useful information, so if you have already bought the old pack, just send £2.00 or US$ 5.00. For the full pack a small charge is required, this time £7.00 in small denomination staps with a stamped addressed envelope, or outside the UK, please send US$ 25.00.
We do accept a UK cheque or bankers draft in Pound Sterling for the above charges as well

SOUND PRACTICES.

If you are seriously interested in the subject of valve amplifier design, without the usual preconceived notions of what is "good" amplifier design and technology (the traditional view, which has brought us the blessings of the transistor amplifier, has obviously disqualified itself quite monumentally), then SOUND PRACTICES is the magazine to read, here you will find articles about design parameters, DIY articles for amplifiers and speakers. reviews of new and old. In other words the very subjects that none of the sellserving, advertising led traditional press will touch as they do not enhance the business of their normal advertisers. You can buy SOUND PRACTICES from us at £5.00 per copy (there are currently 4 issues available) or by subscription from SOUND PRACTICES P. 0. Box 19302, Alexandria, VA 22320, USA. A regular modern world bargain, and there are practically none of those in Audio today. With enough subscription support SOUND PRACTICES may just bring about the "sound practices" that the hi-fi industry has abandoned for so long. So get a subscription!

OUTPUT TRANSFORMERS.

Specifications .
PP = Push-Pull. PPP = Parallel Push-Pull. SE = Single-ended. PSE = Single-ended Parallel. UL signifies 43% ultralinear taps, as a general rule we do not condone the use of UL-taps, as we consider these detriment to sound quality. * * Dynaco replacement.

All primary impedances are calculated for Class A operation the main consideration given to maximum dynamic power transfer ability and minimum distortion. rather than meaningless steady state sine- or squarewave conditions.

All our single-ended output transformers are airgapped, and the maximum standing current allowed before saturation is shown in column 5.

All our output transformers have a frequency response well beyond the audible range, typically 20Hz - 40KHz minus 1.5dB, all are IE-cored with high grade silicon steel laminations, wound with oxygen-free copper wire and supplied with either bell-ends or frames, both with flying leads.

We generally overspecify our transformers by 50% power in Push-Pull (which means that a transformer stated as 25 watts will allow about 35-38 watt peaks. our single-ended outputs are generally over specified by 100%, which means that they will instantaneously allow peaks of double the given maximum power through undistorted.

We do not give any further technical information on our output transformers, as we do not wish to take part in technical competitions, our products are designed to criteria which are and will be understood once they are listened to!

In addition to the output transformers offered below, we offer a design service, where we can supply almost any requirement for wideband transformers. whether for microphones, moving coil cartridges, line input, phase splitter. interstages, driver or power output, we design and manufacture prototypes in-house, the cost for the paper design is £200.00, prototype cost is calculated on a per case basis. We can also produce production quantities.

Sizes are given as Width/Height/Depth, where depth is the depth of the coil itself and width is the length of the core.

PAPER IN OIL SIGNAL CAPACITORS

These handmade signal capacitors are sonically superior to any of the plastic or other paper types we have come across. If you have never experienced the difference that a really good paper/oil capacitor can make in a valve amplifier, then you really should try. Our specially made paper/oil caps have a life, colour, lack of harshness and evenness of dynamic behaviour across the frequency range, which is guaranteed to brighten up your day! Recommended as replacements in old and new valve amplifiers alike (and even in the odd transistor amplifier), and essential for DIY projects. In line with environmental standards, all AUDIO NOTE paper in oil capacitors ccontain only non-toxic, biodegradable vegetable oil, the paper is specially treated and impregnated by a method that enhances longevity and sound quality, to ensure optiimum performance all round.

Value	DC Voltage	Size	Price ex. UK Vat
0.015mF	400volt	21x9mm	2.85
0.022mF	400volt	35x10mm	3.75
0.047mF	400volt	32x11mm	4.10
0.082mF	400 volt	33x14mm	4.25
0.12mF	400 volt	33x14 mm	4.75
0.18mF	400volt	32x16 mm	5.15
0.22mF	400 volt	35x18 mm	5.85
0.33mF	400 volt	43x18 mm	6.75
1.4mF	400 volt	70x24 mm	14.95
0.0015mF	630 volt	17x9 mm	2.85
0.022mF	630 volt	20x10 mm	3.25
0.082mF	630 volt	33x16 mm	4.55
0.18mF	630 volt	43x18 mm	5.45
0.22mF	630 volt	52x19 mm	5.75
0.33mF	630 volt	52x22 mm	7.25
0.39mF	630 volt	52x26 mm	7.95
0.47mF	630volt	52x26mm	8.85
0.22mF	1000 volt	56x26 mm	6.95
0.39mF	1000 volt	61x26 mm	11.65
1.2mF	1000 volt	72x40 mm	16.75
0.22mF	1600 volt	60x26 mm	9.65
0.22mF	2000 volt	70x29 mm	11.55

All Audio Note paper in oil signal capacitors are axial type. We are preparing a range of very small picofarad value paper in oil capacitors at the moment in addition to the above.
The range of AUDIO NOTE paper in oil capacitors is steadily expanding, so ask for values that you do not see.

PAPER IN OIL COPPER FOIL SIGNAL CAPACITORS.

We are currently developing a range of paper in oil capacitors where instead of using aluminium foil as in the above paper caps, we use an oxygen free copper foil with 99.99% pure solid silver lead out wires, these copper foil paper signal capacitors are considerably better than standard offerings Secondly to "bridge" the price-quality gap between the more standard paper/oil caps and the Japanese handmade silver foil signal caps,we will be offering our own 99.99% pure silver foil signal caps, which are pretty staggering in quality, even if I have to say this myself (as I am the only one to have heard the samples so far) the silver foil caps will also have solid silver lead-out wires. To start with there will be a few values/voltages available.

AUD10 NOTE SILVER FOIL SIGNAL CAPACITORS.

Best signal capacitors available, quality really speaks for itself, used in amplifiers like ONGAKU, KEGON, GAKU-ON and M7Tube Silver, handmade in very limited quantities at Audio Notes facility in Tokyo, Japan.

Value	DC Voltage	Price ex. UK Vat.
0.02mF	500 volt	211.75
0.05mF	500 volt	346.75
0.1mF	500 volt	645.75
0.2mF	500 volt	995.75

AUD10 NOTE PAPER IN OIL RESERVOIR

CAPACITORS. Mainly for use in inductor power supplies, but have other uses

Value	DC Voltage	Size	Price Ex. UK Vat.
2mF	400 volt	30x40x55 mm	26.75
2mF	630 volt	35x45x72 mm	33.65
2mF	1000 volt	45x45x72 mm	41.75
2mF	1600 volt	50x70x72 mm	45.95
4mF	1000 volt	45x45x120 mm	49.95
4mF	2500 volt	70x70x120 mm	265.75
10mF	1000 volt	70x100x100 mm	96.75
12mF	1000 volt	70x100x120 mm	109.95
12mF	1600 volt	100x100x120 mm	136.75
12mF	2000 volt	100x100x220 mm	159.75

AUD10 NOTE ACID & CLORIDE FREE SILVER SOLDER.

The best solder we have been able to find. does not contaminate the junction. which over time increases junction resistance. Used in all our amplifiers from OTO to the GAKU-ON.

Weight/Measure	Price Ex. UK Vat
50 ,grammes or about 8 meter 1 mm diameter	19.95
1 kilo roll of 1 mm diameter	210.65

AUD10 NOTE CABLES & WIRES.

We are proud to offer the AUD10 NOTE range of high quality copper and silver coax. speaker and wiring cables, which, depending on the overall price of the project will do justice to any hi-fi system. regardless of price

Solid 99.99% Pure Audio Note Silver Wire.

Gauge	Insulation Material	Price per Meter Ex. UK Vat.
0.05mm	Polyurethane	16.75
0.2mm	Polyurethane	22.75
1 mm	ML	36.75
0.35mm	ML	24.95
0.6mm	ML	27.85
0.8mm	ML	31.75

The above solid silver wires are suitable for inductors for speaker crossovers, both active and passive or for internal wiring in tonearms, amplifiers etc.

AUD10 NOTE HIGH QUALITY STEPPED ATTENUATORS & SWITCHES.

These handmade attenuators and switches are manufactured by a friend of Mr. Kondo of AUD10 NOTE, and represent the best available volume controls and switches you can use in your pre-amplifier, the attenuator is 48 steps and with silver/rhodium plated contacts/ brushes made with an array of tantalum film resistors. The switches feature silver plated contacts and self cleaning action.

Type	Value	Price Ex. UK Vat.
Stereo Potentiometer /Attenuator	50KOhms	198.75
Stereo Potentiometer /Attenuator 2 Channel	100KOhms	207.75
switch 4 Channel	6 - way adjustable	78.75
switch	6 - way adjustable	101.75

AUD10 NOTE HIGH QUALITY CERAMIC VALVE BASES

All of our valve bases are of the highest possible quality, made from steatite and using the best metal parts from alloys which retain their spring tension around the valve pin for longer. They are recommended as upgrades to most old valve amplifiers and should be an essential part of any DIY project.

Type	Mounting	Plating	Price Ex. UK Vat
4-pin UX4 for 300B /2A3/801A	Chassis	Gold	8.25
4-pin UX4 for 300B /2A3/801A	Chassis	Nickel	7.25
4-pin UX4 WE-type for 300B/2A3/801A	Chassis	Silver	14.75
4-pin Jumbo 4 for 211/ VT4C/845	Chassis with bayonet	Silver/chrome	159.95
5-pin UY5 for 807	Chassis	Gold	9.75
7-pin B7 for 6X4, OA2	PCB	Silver	6.15
7-pin B7 for 6X4, OA2	PCB	Gold	7.85
7-pin B7 for 6X4, OA2	Chassis from above	Silver	6.75
7-pin B7 for 6X4, OA2	Chassis from above	Gold	7.95
8-pin U8X for EL34, 6550, 5U4G, GZ34. 6L6G, etc.	Chassis	Silver	5.65
8-pin U8X for EL34, 6550, 5U4G, GZ34, 6L6G, etc.	Chassis	Gold	8.65
9-pin B9 for ECC83, ECC88, 5687, 6350, etc.PCB		Silver	3.85
9-pin B9 for ECC83, ECC88, 5687, 6350, etc.PCB		Gold	5.75
9-pin B9A for ECC83, ECC88, 5687. 6350, etc. etc.	Chassis from above	Silver	4.45
9-pin B9A for ECC83, ECC88, 5687, 6350, etc. etc.	Chassis from above	Gold	6.75
9-pin B9A for ECC83, ECC88, 5687, 6350, etc. etc Chassis from below		Silver	4.95
9-pin B9A for ECC83, ECC88, 5687, 6350, etc. etc Chassis from below		Gold	7.15
Topcap For 807 pentode		Nickel	9.75

You may want to start your project with less overall cost, and for this purpose we can offer the following industrial grade ceramic valve bases.

Type	Mounting	Price Ex. UK Vat.
8-pin for EL34, 6550, KT66, 6L6G	Chassis with bracket	1.45
9-pin for ECC83, ECC88. 5687, 6350	Chassis with shroud	1.85

AUDIO NOTE SELECTED AUDIO VALVES.

Our valves are selected from the best available sources and are tested to the same stringent standards that we apply in the production of our own amplifiers. they fall into two categories, standard production items and rare, mostly NOS (New Old Stock) valves which are no longer in production. We have compiled a special list of the NOS items, which is available on request, beware the valves on this list are NOT cheap.

Standard Stock Items,

Type No.	Type	Price Ex. UK Vat
ECC835/12AX7WA/ 7025	double triode	2.95
E88CC/6922/ 6DJ8WA/7308	double triode	3.95
EF86/6267/Z729	pentode	2.45
ECC82/1 2AU7 /51 89W	double triode. mil spec	5.75
65N7	double triode, U8X base	1.75
65L7GT	double triode, U8X base	2.85
65J7	pentode	1.75
5687WA	double triode very powerful	4.55
6350WA	double triode	4.75
EL84/6BQ5	small power pentode	1.55
EL84M/6BQ5WA	small power pentode, mil spec version	4.75
6V6GT	small power pentode	2.45
6L6G	medium power pentode	2.75
5881/KT66/6L6WGC	medium power tetrode	4.95
EL34G	power pentode	7.45
6550/KT88	large power tetrode	12.45
6C33	powerful regulator, ndirectly heated triode	24.65
6A57/6080	strong regulator, indirectly heated triode	6.45
2A3 4pin	directly heated small power triode	17.95
300B	directly heated power triode	57.95
5U4G	HT-rectifier	3.25
5Y3GT	HT-rectifier	2.25
5V4GT	HT-rectifier	2.25
GZ34/5AR4	HT-rectifier	8.75
6X4	HT-rectifier, very good for pre-amplifiers	2.65

RESISTORS

Beyschlag

We offer three quality levels of resistor quality, all are 1%, starting with the Beyschlag metalfilm, which are slightly magnetic (as are the vast majority of other makes of metal film resistors), but nonetheless very good sounding, as used in all our UK-made amplifiers. up to quality level 3 (the MEISHU/P3) no-feedback triode amplifiers.

Beyschlag 1 watt, 1% resistors up to 500KOhm, £ 0.11, above 500KOhm £0.13 each.

HOLCO.
Better sound quality can be achieved with the H2, 1 watt, 1% non-magnetic resistors, which we regard as the best "industrial grade" metalfilm resistors available. They have one small drawback, as they are quite fragile. and require careful handling, do not bend the legs too close to the body, they may become noisy

HOLCO resistors type H2 50PPM cost £0.36 each from 100Ohm to 500KOhm, higher and lower values are all £0.63 each.

SHINKOH Tantalum Film Resistors.

This is definitely the best sounding resistors available, forget the VISHAY, which may be ok in high feedback transistor amplifiers, but in our opinion quite uncomplimentary to the qualities of real Audio Amplification (i.e. directly heated triode amplifiers running feedback free in single-ended Class A), this is where you will need the tantalum film resistor for the best results.
Up to now the tantalum film resistors have been extremely difficult to get however, after much persuasion and against a minimum quantity guarantee from AUDIO NOTE UK, the manufacturers have agreed to widen the range of 1/2 watt and reintroduce the 1 watt range, I consider this to be a major breakthrough, since without a reasonable range of values at the 1 watt rating it is pretty difficult to get the very best out of our best circuits. As with most handmade specialist items.

Anyway, the 1/2 watt, 1% tantalum resistors are non-magnetic and cost £2.06 each for all available values. There is long delivery on all values, so be prepared to wait if a value is not stock.

AUD10 QUALITY OUTPUT TRANSFORMERS.

Single-ended Circuits.

Suggested Valve	Max Cl. A Power	Prim-Sec. Impedance	Size/Weight Max.	Current	Price ex. UK VAT
EL84/ECL86/6V6	20 watts	2K6 - 4/8 Ohms	117x98x90 mm	110mA PSE	87 .00
300B/2A3/6B4G	25 watts	2K5 - 4/8 Ohms	117x98x90mm	90mA SE	91.00
EL34/6550/KT88	30 watts	1K5 - 4/8 Ohms	115x98x95mm	180mA PSE	113.00
2A3/6B4G	30 watts	1K25 - 4/8 Ohms	98x82x95mm	130mA PSE	97.00
5881/KT66	30 watts	2K1 - 4/8 Ohms	115x98x95mm	140mA PSE	106.00
211/VT4C	30watts	10K - 4/80hms	117x98x100mm	150mA SE	114.00
211/VT4C/845	50 watts	10K - 4/8 Ohms	112x134x150mm	150mA SE	124.00
300B	50 watts	1K25 - 4/8 Ohms	135x115x125mm	180mA PSE	151.00
845	50watts	2K5 -4/8 Ohms	137x114x130mm	180mA PSE	172.00
211/VT4C	75 watts	5K-4/8 Ohms	137x115x145 mm	240mA PSE	237.00
New SE Product					
EL34/6550/KT88	20 watts	3K - 4/8 Ohms	117x98x92 mm	130mA SE	104.00
6L6G	30 watts	3K - 4/8 Ohms	115x98x95 mm	140mA PSE	107.00
Push-Pull Circuits					
EL84/ECL86/6V6	15 watts	8K - 4/8 Ohms	80x67x68 mm	PP	42.00
EL34/6L6G/5881	25 watts	6K - 4/8 Ohms	88x73x80 mm	PP	59.00
2A3/6B4G/300B	30 watts	5K - 4/8 Ohms	88x75x80 mm	PP	63.00
KT88/6550	50 watts	6K6 - 4/8 Ohms	108x91x90 mm	PP	73.00
EL34/KT66/5881	50 watts	3K - 4/8 Ohms	98x82x83 mm	PPP	74.00
845	50 watts	6K8 - 4/8 Ohms	108x91x90 mm	PP	114.00
Pure Silver Wired Outputs.					
300B/2A3/ 6B4G 25 watts	2K5 - 4/8 Ohms	117x98x90 mm	90mA	SE	1,645.00
211/VT4-C/845 50watts	10K - 4/80hms	112x134x150mm	150mA	SE	1,975.00

The AUD10 NOTE silver wired outputs listed here are designed and made in the UK, we can supply the AUD10 NOTE Japan manufactured outputs for the ONGAKU or the KEGON, but they are exceptionally expensive, as you would expect from items that take upwards from 100 hours each to make, for example an output transformer for an ONGAKU costs £16,500.00.

AUDIO NOTE CHOKES & INDUCTORS.

Value	Size	Price Ex. UK Vat
3H/1 00mA		14.00
5H/1 50mA		21.00
10H/125mA	63x74x76 mm	26.00
10H/200mA	98x65x83 mm	33.00
0.5H/400mA		18.00
3H/2250mA for ONGKU/Cu		24.00
5H/400mA		31.00
20H/50mA	68x56x58mm	24.00

Other values can be supplied by order, ask for quote.

AUD10 NOTE Coax Interconnect Cables.

Type/Colour code	Construction	Price per Stereo Meter Ex. UK Vat.
AN-A yellow	symmetrical 6N copper litz coax	15.32
AN-C red	symmetrical OFHC copper litz coax	29.79
AN-S dark grey with yellow stripe	symmetrical 99.99% silver litz coax	84.25
AN-V silver grey with yellow stripe	symmetrical 99.99% silver litz coax	152.35
AN-Vx silver grey	symmetrical 99.99% silver litz coax	382.98

It is recommended to use the internal twin silver wires in the AUD10 NOTE coax cables as internal wiring cable, this is what we do in amplifiers like the ONGAKU, M7Tube etc.

BLACK GATE ELECTRON TRANSFER, High Performance, Graphite Electrolytic capacitors.

There are very few audio parts that promise a guaranteed improvement when replacing practically any other part, but this is what the BLACK GATE capacitors actually do. Exchanging any electrolytic capacitor anywhere in the circuit of an amplifier or in the crossover of a speaker will greatly improve sound quality. We are working on some guidelines as to where, how and which types of Black Gates to use in different circuits, the first such technical guideline is available now and is called "Improving your CD-Player" and can be obtained by sending a stamped addressed envelope to us requesting this leaflet.
It is very important to note that all BLACK GATE capacitors take time to charge-up or stabilize. when first put in circuit, depending on type and application this "maturing" time can be between 100 and 300 hours.

Value	Voltage	BG-Type	Suggested Use	Price Ex. UK Vat
0.47mF	50volt	PK	Anywhere	1.05
1 mF	50volt	PK	Anywhere	1.25
2.2mF	50volt	PK	Anywhere	1.55
4.7mF	50volt	PK	Anywhere	2.15
22mF	50volt	PK	Anywhere	3.35
100mF	100volt	Standard	Anywhere	7.75
1 000mF	50volt	Standard	Anywhere	24.55
220mF	1 6volt	Standard	Anywhere	4.35
470mF	1 6volt	Standard	Anywhere	6.35
2230mF	50volt	standard	Anywhere	13.45
10,000mF	80volt	Standard	PSU smoothing	234.65
4700mF	1 6volt	Standard	Anywhere	14.25
47mF + 47mF	500volt - 550v surge	SK-Type	PSU filter capacitor	85.95
100mF + 100mF	500volt - 550v surge	SK-Type	PSU filter capacitor	101.95
100mF	500volt - 550v surge	SK-Type	PSU filter capacitor	72.75
220mF + 220mF	350volt - 400v surge	SK-Type	PSU filter capacitor	92.65
100mF +	100mF	350volt - 400v surge	SK-Type	PSU filter capacitor 75.35
22mF		350volt	VK-Type	Decoupling or filter capacitor 18.95
220mF		1 6volt	F-Type	Low ESR version 6.75
220mF		1 6volt	FK-Type	Ultra low ESR version, comparable to film caps 9.95
1000mF		50volt	FK-Type	As above use anywhere 43.95
2200mF		50volt	FK-Type	As above use anywhere 98.85
4.7mF		50volt	C-Type	For circuits with DC potential difference 3.35
1 mF		50volt	N-Series	Bipolar for use in negative feedback circuits etc. 4.95
4.7mF		50volt	N-Series	as above 5.75
10mF		50volt	N-Series	as above 6.95
47mF		50volt	N-Series	as above 13.75
100mF		50volt	N-Series	as above 18.95
6.8mF		50volt	Bipolar	For loudspeaker crossover networks 8.95
1 0mF		50volt	Bipolar	as above 10.85
22mF		50volt	Bipolar	as above 17.45
47mF		50 volt	Bipolar	as above 27.95
100mF		16volt	BG-N Type	For super low noise PSU 's 24.65
470mF		16volt	BG-N Type	as above 28.95
1000mF		50volt	BG-N Type	as above 99.95
220mF		100volt	BG-N Type	as above 423.35

On the next page is a list of all BLACK GATE capacitors available, together their sizes. best usage etc.
Lastly, we can supply a range of more modestly prices components, still good quality, but more industrial grade, if you like.

AUDIO NOTE COMPLETE KITS.

We are developing a range of complete kits, to give those of you who have the ability, but do not have the time to develop a project from the ground, so to speak. In order to be able to offer the best possible quality - price relationship the kits we offer will be good basic circuits, with no-frills power supplies and components.

Kit One.

Based around the justly famous 300B directly heated triode, we see this kit as the introduction to real Audio Amplification, as it covers all the important aspects of design necessary, Single-Ended, No-Feedback, Class A, Directly Heated Triode, to become a member of this exclusive club of amplifiers.

Kit One has one 300B per channel running at 420 volts with 75mA current giving 9/10 watts of the cleanest power you will ever hear, the input stage consists of a 65N7GT with a 5687 double triode driver stage running in SRPP.

The powersupply is a capacitor-choke-capacitor with a 5U4G HT rectifier, the heaters are AC heated.

Component quality is similar to our Level 2 finished products, AUD10 NOTE paper in oil signal capacitors, Beyschlag 1watt 1% metalfilm resistors, good quality electrolytics (sorry NO Black Gates!) and a simple, attractive stereo chassis in grey paintwork. Protecting cover is extra.

Price £750.00 incl. Vat, which includes all valves (yes, also the 2 x 300B needed) but not postage/packing which to UK customers is £12.00, topcover is £99.00 extra.The Kit One is available now.

Kit Two.

Kit Two features a single 6550WA Sovtek tetrode running in Single-Ended mode, yeilding some 17 watts of pure Class A, valve rectified HT for the output stage, stereo chassis, and 6SL 7GT input and 6SH 7GT SRPP driver stage, componentry and chassis as Kit One.
Price £600.00 incl. Vat, includes valves, but not postage/packing, cover is extra at £99.00.
Available in March '94.
Write to,
AUD10 NOTE (UK) Ltd. Unit 1, Block C. Hove Business Centre, Fonthill Road, Hove, East Sussex, BN3 6HA, England. **Telephone +44 0273 220511, fax +44 0273 731498. Direct Line to sales +44 0273 8 8 5 5 1 1 .**

MAINS TRANSFORMERS

This range relates to our finished products, mains transformers are notoriously difficult items to offer as the number of permutations of HT and Heater voltages are almost endless. We shall be offering a more comprehensive range as opportunities arise.

Primary Voltages	Secondary HT Windings	Secondary Heater Windings	Price Ex. UK Vat
Ov/100v/110v/120v	Ov-230v at 350mA	Ov-12.6v at 1 Amp	34.00
Ov/220v/230v/240v	3.1 5v-Ov-3.1 5v at 4 Amp		
120v/1 10v/100v/0v	Ov - 230v at 0.4 Amp	Ov-12.6v at 1 A	41.00
Ov/1 00v/11 Ov/1 20v	3.1 5v - 3.1 5v at 4 Amp		
Ov/1 00v/11 Ov/1 20v	Ov - 290v at 40mA	1 2.6v-Ov at 1 .5A	26.00
Ov/100v/110v/120v	Ov- 6.3v at 300mA		
Ov/100v/1 10v/120v	310v-244v-Ov-244v-310v at	3.15v -Ov-3.15v at 4.5 Amp	72.50
Ov/100v/110v/120v	320mA	12.6v at 1.5 Amp	
120v/110v/100v/0v	Ov-920v at 160mA	0 -10v at 4 Amp, Ov-6.3v at	98.00
Ov/100v/110v/120v	150v-150v at 50 mA1.5A,	Ov - 5v at 2.5A	
120v/1 10v/1 10v/0v	390v-0v-390v at 200 mA	3.15v-Ov-3.15v at 1 .2Amp, 7v	86.70
OV/1 OOV/11			
OV/1	20v1 70v at 50mAat 3A.	7v at 3A, 5v at 2A	
120v/110v/100v/0v	425v-0v-45v at 220mA	3.15v-ov-3.15v at 2.5A	95.60
100v/110v/120v		7.0v-0v, 7.0v-0v, 5.0v-0v	for KIT ONE or
		3.15v-0v-3.15v at 750mA	"KASSAI" replica

AUD10 NOTE Speaker & Wiring Cables.

Type/Colour code	Construction	Price per Mono Meter Ex. UK Vat.
AN-D green	single core 6N copper speaker wiring	6.85
AN-B blue white writing	double strand. s creened 6N speaker wire	12.34
AN-L blue black writing	double strand, screened 6N litz copper speaker wire	25.11
AN-SP silver	single core 15 strand 99.99% litz silver speaker wire	106.38
AN-SPx silver	single core 20 strand 99 .99 % litz silver speaker wire	382 .98

PTFE Insulated Silver Plated Copper Wires.

We can also provide less expensive wiring wires for hard wiring circuits, these PTFE insulated silver plated copper wires are 19 strand of 0.15 mm wire and come in brown, black, blue, pink, red, green, orange, violet, white and red/white, they cost £1.60 per meter in any colour

Tel. +44 0273 220511
Fax. +44 0273 731498
Sales +44 0273 885511

AUDIO NOTE

PASSIVE PRE-AMP

A cable compensated passive-preamplifier designed and written by Richard Brice.

I first suggested the idea of a cable-compensated "passive preamplifier" in my column Recorded Message in the March 1994 issue of Hi-Fi World. Since then, judging from the number of telephone enquiries, I've come to realise that the project clearly appeals to many would-be constructors, having the particular merit that it is extremely simple to build.

The principle behind cable-compensation is not new, the concept is borrowed from its implementation in test equipment. For instance, the designers of oscilloscopes ameliorate the effects of high-frequency distortion due to the cable connecting the measuring probe to the oscilloscope display itself by using a cunning technique to make the cable "disappear" in electrical terms. Fig 1 illustrates the principle: VC1 is used to "tune-out" the effect of the cable.

Unfortunately, the straightforward execution of the method illustrated in Fig. 1 applied to a passive pre-amp is hindered by several practical hurdles. It is for this reason that, when I first suggested the idea, I omitted component values. Neither due to deliberate obscuration nor oversight, the problem with suggesting circuit values stems from the fact that the choice of exact values depends on knowing:

1) The output impedance of the source being fed to the control unit.

2) The resistance of the potentiometer.

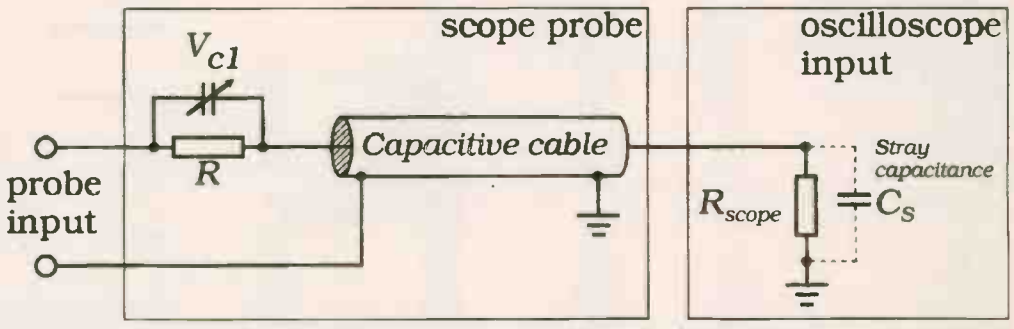
3) The capacitance per unit length of the following cable.

4) The length of the following cable.

5) The input impedance of the power-amplifier.

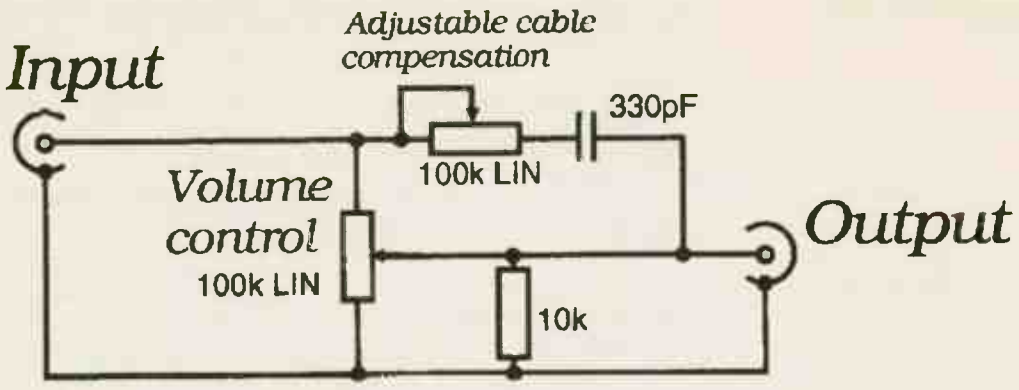
6) The position of the volume control when listening at normal levels.

So many imponderables in fact, that it seemed to me the inclusion of some hastily-conceived circuit values could lead to some disappointing results should anyone wish to try the technique. The new design, shown in Fig. 2, eschews many of the disadvantages of the simple circuit suggested in my original article by including a continuously variable cable compensation control which allows the control unit to be "tweaked" to match the cable it is intended to be used with. A further refinement is the implementation of a quasi log-taper volume control achieved by means of a linear 100kΩ



Scope probe - principle behind 'j-solat' pre-amp

Fig. 1



'j-solat' cable compensated passive pre-amp

Fig. 2

control shunted with a 10kΩ fixed resistor across the wiper and earth. This circuit arrangement has the virtue that the output resistance remains more constant with respect to control position than is the case with a simple log control. (Be warned - the price you pay for this advantage is that the input impedance variation is normally larger!) The cable compensation control is designed to compensate for capacitive loads between 50pF and 500pF, which should allow adequate allowance for the majority of interconnects.

The cable-compensation control must act equally on both channels, so the control should be a linear dual ganged 100kΩ potentiometer. You can choose to adjust the control in a number of different ways:

1) use test equipment - a scope or an AC voltmeter - to give the best frequency response.

2) by ear, or,

3) using the rubic shown in Fig. 3.

MEASUREMENTS

Measurements with and without cable compensation for a load of 500pF are given in Table 1. As you can see, the technique reduces frequency response aberrations and (perhaps more importantly) reduces phase-shift, thus preserving the waveform of complex signals more faithfully.

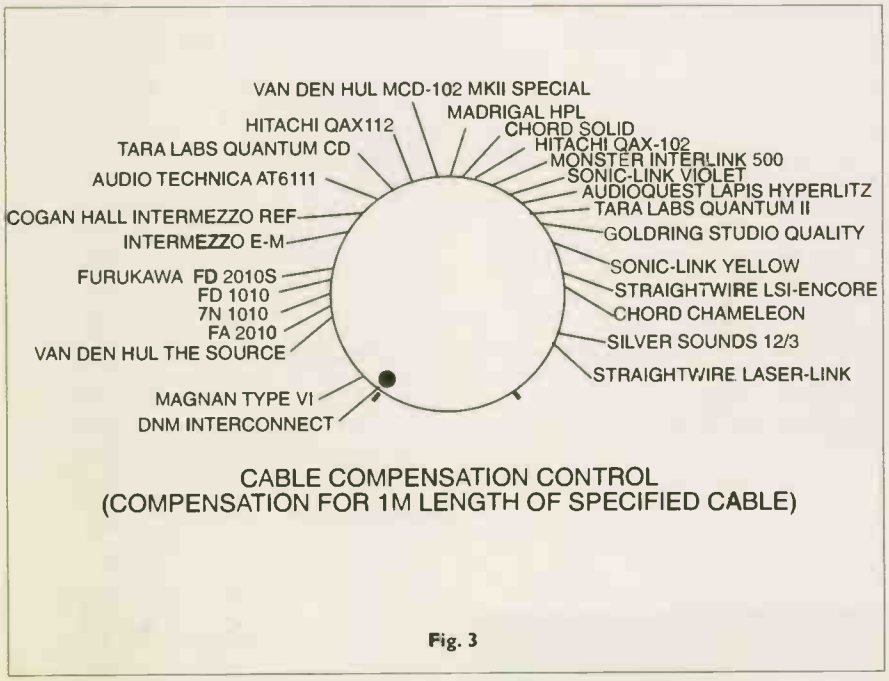


Fig. 3

In this diagram I have marked the positions best suited to compensate for a 1 metre length of various cables based on published data* on capacitance per unit length.

Table 1. Results - with and without cable compensation.

Freq	Gain		Phase Shift	
	without	with	without	with
3kHz	-6dB	-6dB	3°	0°
6kHz	-6.1dB	-6dB	5°	2°
9kHz	-6.1dB	-6dB	9°	3°
15kHz	-6.3dB	-6dB	13°	5°
20kHz	-6.6dB	-5.9dB	19°	8°

My prototype pre-amp is illustrated in the head shot. I named the unit the j-solat interconnect isolated control unit, the "j" refers to the engineer's term for the complex (eg. capacitive) part of the following circuit impedance which the cable compensation is intended to isolate. (isolate becomes j-solate becomes j-solat, oh well, it was fun at the time!)

Bored of the usual run-of-the-mill control knobs, I opted for my own design which I had turned at a local engineering works from a rod of Nickel Steel. Inspired by my favourite fashion designer, Jean-Paul Gaultier, the pre-amp inexplicably sounds its very best playing Madonna CDs!

References

*** Hi-Fi Choice Pocket Guide to Interconnect Cables 1992 Dennis Publishing.**

KIT & COMPONENT SUPPLIERS

LOUDSPEAKER KIT SUPPLIERS

Bandor Design & Development Studios
11 Penfold Cottages, Penfold Lane, Holmer Green,Bucks HP15 6XR
Tel. (0494) 714058
Bandor Musical Drive Units cover the entire audio spectrum with one 50mm (100Hz - 35K) and one 150mm (20Hz - 8K). One driver covers 2/3 RD of the frequency. Crossovers 150 Hz/8K. Anodised aluminium spun cones. 1.3 grams moving mass gives crisp transients. Good power handling. Robust. 35 YEARS EXPERIENCE.

Tabula Rasa
136 Kilnwood, High Wycombe, HP14 4UR
Tel. (0494) 565116
A young company specialising in the distribution of loudspeaker kits, components, accessories, and design measuring equipment from Germany, where the DIY loudspeaker has been well established and very successful for many years.
We handle speaker kits (with or without cabinets), a wide range of drivers, filters, filter components and accessories. Very low cable prices. Loudspeaker designs, measurement systems and high quality filter components also available. 30 day money back guarantee on all speaker kits. Send £2.00 (returnable on purchase of any speaker kit) for our catalogue. Trade enquiries welcome.

Faraday Sound
248 Hall Road, Norwich, NR1 2PW.
Tel. 0603 762967
Loudspeakers in Concrete
Now you can build your own low density concrete cabinet enclosure Faraday FS1, Siren, FS5, FS10 or a design of your own choice. Stunning sound. Simple DIY skills only. Full instructions including cabinet construction for only £10.00. Includes reviews, photo's etc. and at least £10.00 discount off any further products purchased from us e.g. ready made cabinets. Also £25 - £150 off any complete loudspeakers!!.

Hart Electronic Kits Ltd
Penylan Mill, Oswestry, Shropshire SY10 9AF
24 Hr sales / enquiries Tel. 0691 652892
A range of Audiophile kits for 80 watt Power Amplifiers, Tuners, Pre-Amps and Moving Coil / Moving Magnet RIAA Pickup Preamps. All kits are fully engineered, with our thirty years design experience, for easy constructions from circuits by John Lindsey Hood, the most respected designer in the field. Send for lists.

The Speaker Company
Unit 9, Waterside Mill, Waterside, Macclesfield, Cheshire SK11 7HG
tel. 0625 500507
The Speaker Company are a new company offering a wide range of loudspeaker drive units from Audax, Celestion, KEF, Morel SEAS, Volt and a new ribbon tweeter. Also a wide range of associated accessories for the speaker builder.

Falcon DIY Speakers
Falcon Electronics, Tabor House, Mulbarton, Norfolk NR14 8JT
Tel. 0508 78272
Falcon sell kits, drive units and crossover components and have a large range of books and back issues of kit magazines. Please send large SAE (34p) for free price list.

Wilmslow Audio
Wellington Close, Parkgate Trading Estate, Knutsford, Cheshire WA16 8DX
Tel. 0565 650605 Fax. 0565 650080
Extensive range of drive units and over 30 different designs of self-assembly kit. Two 'ATC' kits now available. Drive units include those from KEF, Dynaudio, Audax, SEAS, Peerless, Scanspeak and Morel. Everything required for the loudspeaker builder and four dem rooms to listen to the kits in built-up form. Two new kits from Morel - one 3 litre, magnetically shielded, one 11 litre book shelf.

IPL Acoustics
2 Laverton Road, Westbury, Wilts BA13 BRS
Tel. 0373 823333
IPL supply a range of eight speaker kits using drive units from SEAS, Morel, Audax, Visaton etc. including four transmission lines to suit all room sizes. We also supply a full range of drive units, capacitors, and cabinet accesones as well as silver plated P.T.F.E. insulated cables.

DBS Audio
PO Box 91, Bury St Edmunds,Suffolk IP30 0NF
Tel. 0284 828926
Sole authorised supplier of DBS loudspeaker kits designed by Dave Berriman. The acclaimed DBS6 kit includes Morel tweeters and custom built woofers, plus top quality pre-assembled crossover and components.

VALVE AND OUPUT TRANSFORMER SUPPLIERS

Vintage Valves,
PO Box 147,
Station A, Vancouver B.C.
Canada, U6C 2M3. Fax (604) 876 5876.
Dynaco, Sherwood, Scott, The Fisher, McIntosh, Eico, Harmon Kardon, Heath, Altec, Stromberg- Carbon. Many vintage parts and equipment available on request.

Langrex Supplies Ltd
1 Mayo Road, Croydon, Surrey CRO 2QP
Tel. 081 684 1166 or fax. 081 684 3056
One of the largest distributors of electronic valves, tubes and semi-conductors in the UK by original UK and USA manufacturers. Obsolete types are a speciality. Telephone or fax for an immediate quotation.

Billington Export Ltd.
1E Gillmans Trading Est., Billinghurst, Sussex RH14 9E3
Tel. 0403 784961 or fax. 0403 783 519.
Billington Export Ltd. are one of only two or three suppliers of obsolete cathode ray tubes in England. DG7-32, DG7-36, and 3WP1. Data can be sent on request with any valve or cathode ray tube order. (minimum order £50.00)

PM Components
Springhead Enterprise Park
Springhead Road, Gravesend,, Kent DA11 3HD
Tel. 0474 560521
Suppliers of Shuguang Golden Dragon valves amongst others.

Sowter Transformers
EA Sowter Ltd
PO Box 36, Ipswich IP1 2EL
Tel. 0473 219390/252794
Output and mains transformers for GEC KT88 circuits. Can also make any other transformer to order. Send SAE for lists and data.

Chelmer Valve Company
130 New London Road, Chelmsford, Essex CM20RG
Tel 0245 265865 Fax. 0245 490064.
Supplier of premium range of audio valves, other valves and components also available. (Please see our ad on inside back cover of this supplement).

RESTORATION

GT Audio
5 Upper Road, Higher Denham, Bucks UB9 5EJ
Tel. 0895 833099
Professional repair/restoration of all hi-fi including classic and vintage equipment. Supplier of very high quality electronic components, in particular types which are difficult to source. Original valves available, i.e.. Mullard, Brimar, GEC, GE, RCA, Sylvania etc.

COMPONENT SUPPLIERS

Audio Components Ltd
Albany Court, Albany Road, Granby Industrial Estate, Weymouth, Dorset, DT4 9TH
Tel. 0305 761017 Fax. 0305 761492
Audio Components supply the Audio Innovations Classic 25 Kit Amplifier. This valve Line Intergrated design offers 4 line inputs, a tape loop and 25 watts of Class A power in an elegant, domestically friendly casework. It comes with a comprehensive 40 page instruction manual and a guaranteed fixed price competion service should any difficulties be encountered. Price is £699.

SJS Acoustics
Ben-Dor, Lumb Carr Road, Holcombe, Bury, BL8 4NN.
Suppliers of difficult to find high quality components for valve amplifiers: including Single Ended Output Transformers, Signal and Power Supply Capacitors, PTFE Board and Silver Wire. For full information and a catalogue send an SSAE to the above address.

AP Electronics
20 Derwent Centre, Clarke Street, Derby, DE1 2BU
Check out the AP electronics 1993 catalogue. It's free with every order over £30.00. AP - for pre-amp kits, power amp kits, integrated amp kits plus everything else from resistors to mains cables.

Chelmer Valve Company (pls look under valves)

Electromail
PO Box 33, Corby, Northants NN17 9EL
Tel.0536 204555
The branch of the well known RS Components trade mail order business that deals with the public. They have a huge range of components and catalogues to match.

Norwood Electronics
Unit 8 Pinbush Road, South Lowestoft Ind Est, Lowestoft, Suffolk NR33 7NL
Components suppliers:- DAC's, digital filters, Digital interface IC's, Optical transeivers/Cables, OP-Amps.
Kits:- DACs and Power Amps.

Omni Electronics
174 Dalkeith Road, Edinburgh EH16 5DX
Tel. 031 667 2611
A wide range of components aimed at the hobbyist, competitive VAT incl. prices, mail order and a friendly service. Open Mon-Thurs 9.15-6.00, Friday 9.15-5.00 and Sat's 9.30-5.00.

RATA Ltd
Edge Bank House, Skelsmergh, Kendal, Cumbria LA8 9AS
Tel. 0539 823247
RATA specialise in supplying high grade audiophile components and cables. They also have a small range of drive units and kit amplifiers.

VINTAGE DIY

Loricraft Audio
4 Big Lane, Goose Green, Lambourn, Berks RG16 7SQ
Tel. 0488 72267
Specialist restoration of 301's and 401's using genuine spares and re-manufactured parts to original pristine standards in our newly built workshops designed primarily for these purposes.

HI-FI WORLD LIBRARY

ELECTROSTATIC LOUDSPEAKER DESIGN AND CONSTRUCTION, by Ronald Wagner. £19.95

This book takes you step by step through the design and construction of a full range electrostatic loudspeaker, including the basic operating principles behind electrostatics. Whether you intend to build your own electrostatic, repair and restore a vintage electrostatic or are just interested in the principles behind electrostatics, this book is a must.

MULLARD TUBE CIRCUITS FOR AUDIO AMPLIFIERS. £13.95

First published in 1959 by Mullard, this book includes full designs for eleven power and control amplifiers, including the 5-20, using valves. This book begins with a four-chapter tutorial on getting the best sound from valve amplifiers.

THE ART OF LINEAR ELECTRONICS, by J. Linsley-Hood. £16.95

Concentrates specifically on analogue electronics for audio and goes into detail on obscure topics like the drawbacks of feedback, as well as its advantages. Covers mainly solid state but also includes valves. A must for serious enthusiasts and budding designers.

THE WILLIAMSON AMPLIFIER, by D. T. N. Williamson. £9.95

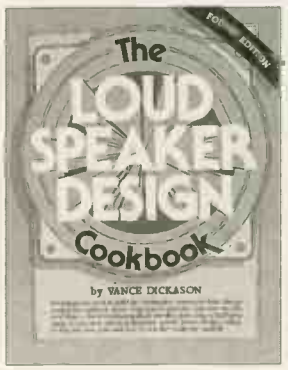
In April 1947, Williamson's valve power amplifier become an overnight success. The author takes you deep into his design decisions and offers practical advice on how to build the amplifier and set it up for best performance.

LOUDSPEAKERS: THE WHY AND HOW OF GOOD REPRODUCTION, by G. A. Briggs. £10.95

A popular and easy to understand book on building loudspeakers, using empirical techniques that pre-date computer analysis. A fine grounding, written by a manufacturer with first hand experience - recommended for beginners.

THE LOUDSPEAKER DESIGN COOKBOOK, by Vance Dickason. £23.75

This best selling book in the field of loudspeakers offers good, up-to-date practical design information for the home constructor. Like today's manufacturers it uses modern Thiele Small theory and parameters.



THE ART OF ELECTRONICS, by P. Horowitz and W. Hill. £35

The definitive electronics book. The Art of Electronics is an ideal book for the beginner through to the engineer. Written in easy to understand English, each chapter takes you from basic first principles through to full design exercises and practical circuits.

AUDIO AND HI-FI HANDBOOK, edited by I. R. Sinclair. £40.00

The Audio and Hi-Fi Handbook is written by some of the best known designers and spokespeople of the audio industry. It offers an insight into every area of audio, from sound waves and acoustics, through to car hi-fi.

HI-FI WORLD LIBRARY
PRICE LIST AND ORDER FORM

Please send me:

- ☐ Electrostatic Loudspeaker Design & Construction....£19.95
- ☐ The Williamson Amplifier.....£9.95
- ☐ Loudspeakers: The Why & How of Good Reproduction...£10.95
- ☐ Mullard Circuits for Audio Amplifiers £13.95
- ☐ The Loudspeaker Design Cookbook.....£23.75
- ☐ The Art of Electroncis.....£35.00
- ☐ The Art of Linear Electronics.....£16.95
- ☐ Audio & Hi-Fi Handbook.....£40.00

All prices are exclusive of postage & packing. For U.K. please add £4.00 if ordering 1 book and £7.00 for 2 to 9 books. For 10 or more books p&p is free. Overseas please contact us for rates.

I enclose cheque/PO for £ .....made payable to **World Audio Publishing Ltd.**

I wish to pay by Visa/Access, please debit my account no:

Expiry date:

Name.....

Delivery Address.....

.....

.....

N.B. If delivery address if different to the credit card holder's address please supply both.

Tel:.....

Please send completed order form together with your cheque/PO to:
HI-FI WORLD BOOKS,
64 Castellain Road,
Maida Vale,
London W9 1EX.

Credit Card Orders
Telephone 071 - 266 0461
24 hour Mail Order Answerphone

Please allow 28 days for delivery

Review

SPECTRA DYNAMICS DEFLEX

speaker damping pads

£8/£12

Jimmy Hughes sets to work on his Impulse H-1 speakers with a set of polymer panels designed to improve the sound by eliminating standing waves

Four or five years ago I wrote an article describing the benefits to be had by removing the internal damping from loudspeakers. An undamped speaker typically has more life and impact than its damped counterpart.

Undamped speakers sound more freely able to move air, giving a bigger sound even at lowish volume levels. In a word, the music breathes.

Drawbacks? Well, undamped speakers can lack tightness and control, and coloration levels may be higher too.

So I was intrigued when a set of acoustic damping pads arrived from Spectra Dynamics. At first I intended to use them in a conventional damped speaker, but then decided to try them in my undamped Impulse H-1 horn speakers instead.

Previously, I'd heard H-1s damped, and much preferred the undamped version. However, fitting Deflex panels seemed to give greater tightness and control, improved internal clarity, and better pitch definition – all without deadening the sound in any way.

Because the Impulse H-1 has an open-backed midrange unit, accessible simply by removing the top cover, it was easy to fit and remove Deflex panels behind it for A/B comparisons. However, the benefits were so obvious that it was hardly necessary to compare back and forth.

I later tried four panels in the bass chamber and again heard big improvements in control, definition, and clarity. I especially liked the way Deflex treatment gives the benefits of damping with none of the drawbacks.

Each panel is fairly easy to fit – though much depends on the speaker being treated. In most cases you'd simple remove the bass driver, take out the speaker's internal wadding/damping, and fit the Deflex panel as required. Naturally such work invalidates the speaker manufacturer's guarantee, so only attempt the modification if you feel competent to do so.

■ **Right of Reply:** *see page 59*

DATA

Price:	*£7.95 standard panels*
	£11.95 subwoofer panel
Size:	*280x210mm*
Thickness:	*Min (Centre) 5mm*
	Max (Edge) 12mm
Material:	*Advanced polymer*
Colour:	*Charcoal grey*

DESIGN

- *Advanced Polymer damping panel*
- *Concentric surface relief to reduce standing waves*

PERFORMANCE

- *Gives tighter cleaner sound*
- *Improves bass definition*
- *Allows the sound to breathe*

THE DESIGN BEHIND THE DEFLEX PANEL

Deflex panels are made from an advanced polymer on the verge of flowing liquid. An excellent shock absorber, its surface undulation has been designed to eliminate standing waves.

The panel's thick heavy composition makes it very good at damping resonances, and for this reason Spectra Dynamics recommend you remove unnecessary damping panels from inside the speaker where these are fitted.

Three years were spent developing them, emphasising that Deflex panels are purpose-designed speaker fittings not a by-product of another industry.

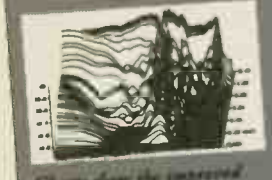
The panels can be cut to size using scissors and then stuck in place using a glue such as Copydex. If required, distributors The Speaker Company can supply panel adhesive.

Panel size is 280x210mm, and maximum thickness 12mm falling to 5mm at the centre. Fitting should be straightforward, but not all speakers are suitable. For example, Linn Isobarik may benefit, but are extremely difficult to gain entry to because the drive units are mantle-mated in place.

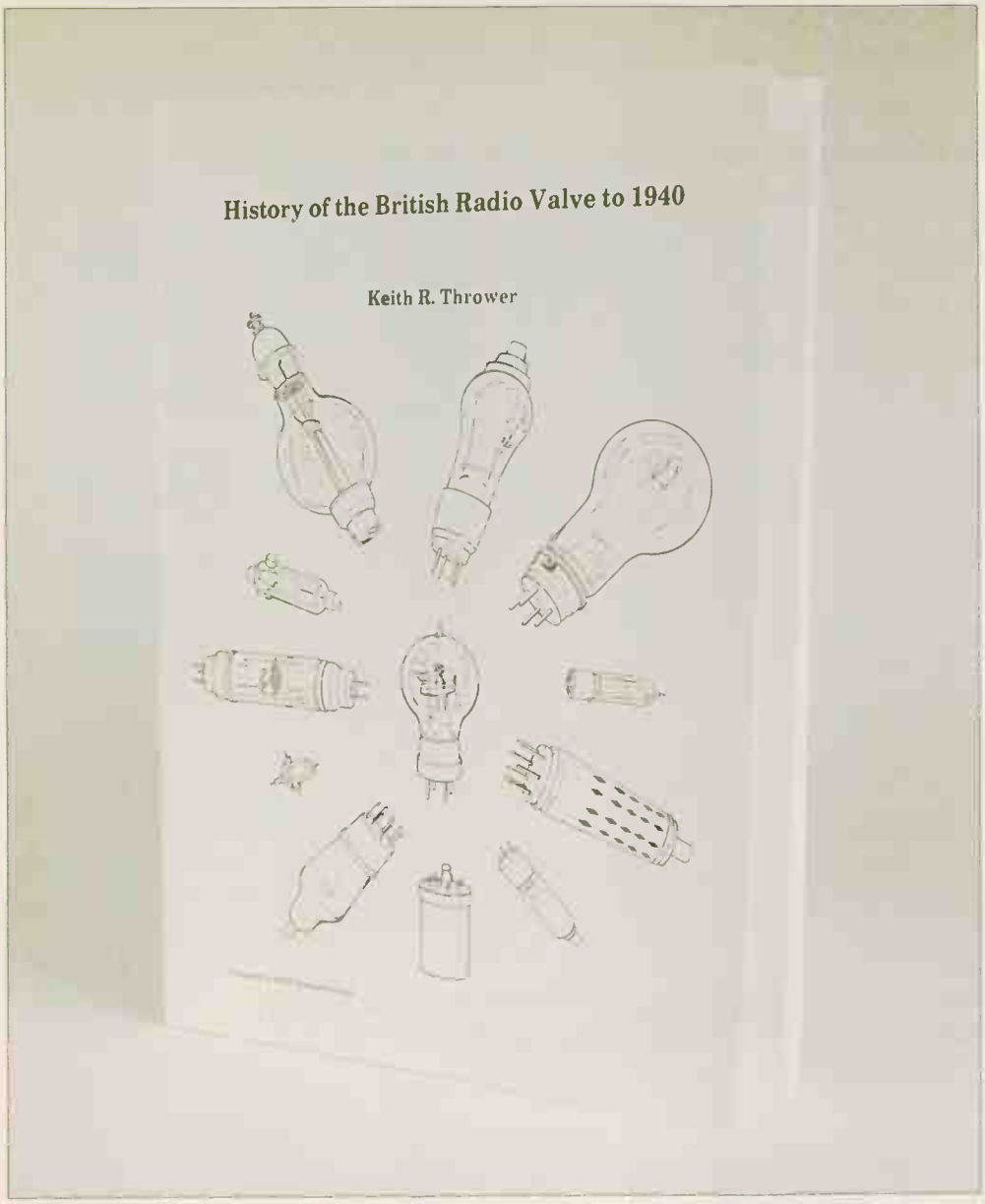
It's difficult to decide beforehand whether Deflex panels are going to make an improvement. But you can gain an idea of the likely outcome by listening to the speaker minus its damping before ordering.

This allows you to hear any adverse effects produced by the existing damping, and also tells you how easy it is to gain access to the speaker's innards. Modify one speaker only, then (with damping removed) compare it to the other.

If the damped speaker sounds muffled and 'slow' and you prefer the undamped one (even if usually it isn't quite right), a set of Deflex panels should work successfully giving the best of both options.



Charts show the improved energy extraction of enclosure with panels (above) compared with undamped enclosure (top)



HISTORY OF THE BRITISH RADIO VALVE TO 1940, by K. R. Thrower.

Reviewed by Noel Keywood.

What a delightfully obscure title, and how appropriate too, for this is an obscure book in lay terms, yet for valve-heads it will be required reading. As its name suggests, the book covers valves generally, rather than in a hi-fi context, which isn't surprising because hi-fi is a post-war notion which this book pre-dates. All the same, anyone with an interest in valve history will find the book impressively well researched and detailed; I personally found it fascinating.

The early history of the valve is covered in detail, revealing the difficulties Fleming and then Lee de Forest had in producing adequate vacuums and satisfactory electrodes at the turn of the century, as well as the difficulties they had in appreciating fully the mechanisms at work in thermionic emission. For example, many scientists and engineers of the time thought that air was necessary for conduction. Although Langmuir of AT&T labs. in the USA realised a 'hard' vacuum was necessary, even the Americans had to import a special mercury pump from Germany to achieve it.

Both Alexander Fleming, who worked in London on the diode until 1906, and Lee de Forest who invented the three-electrode (triode) valve in 1905, saw them as rectifiers rather than as amplifiers. It was the laboratories and scientists of AT&T and General Electric in the USA who developed de Forest's 'Audion' valve into an amplifier for telephony. They paid de Forest no less than $390,000 in all for his patents, a fantastic amount for the time.

Parallel developments in Germany are covered, including a fascinating comment that "Nernst, Lieben's teacher and friend, on numerous occasions observed the fidelity of amplification of Lieben's device". Made in 1906, this comment must surely be one of the first ever references to the notion of fidelity in amplification.

Keith Thrower's book is intensively researched from original research papers and records, copiously illustrated with pictures and diagrams, wide ranging in its coverage (American, British and German work is described) and possesses long lists of references and bibliographies. There's no doubt that he has put enormous effort into this book.

From early researches, the book moves on to cover development of the valve as an amplifier, from 1913 until 1940, mainly within the context of radio, but with good reference to audio amplification too. Surprisingly, as if all this was not enough, there's a comprehensive chapter on valve construction as well, covering materials, design rationales, problems and solutions. Plus a short history of British valve manufacturers.

If there's any criticism I could make of this book it is that it attempts too much, in the process losing the thread of the story of the valve's development, for example. But this is a very minor point in comparison to all that it achieves, and all that it offers.

The History of the British Radio Valve to 1940 is an impressive work by an engineer quite obviously dedicated to his subject and determined to produce a valuable reference work. As far as I know, it is one of a kind. The book is not on general sale. I had to contact Keith Thrower, the author (and Research Director at Racal Radio), personally to get hold of a copy. So will you! Copies of this book can be obtained by sending a cheque for £10.25 to :

K.R. Thrower,
Old Cedar,
12 Wychcotes,
St Peter's Avenue,
Caversham,
READING RG4 7DA.

Golden Dragon

Precision Audio Tubes

Please enquire or any tube types not listed. We have an inventory of over 2,500 different types in stock.

RETAIL PRICE LIST

Golden Dragon Pre-Amplifier Tubes	Singles
6AQ8/ECC85	£6.50
12AT7A/E81CC/ECC81	£6.95
12AU7A/E82CC/ECC82	£6.95
12AX7A/E88CC/ECC83	£6.95
6DJ8/E88CC/ECC88	£10.95
6SL7GT/ECC35	£7.50
6SN7GT/ECC33	£8.95

Special Quality Golden Dragon Pre-Amplifier Tubes	Singles
E81CC-01 Gold Pins Low Microphony Low Noise	£10.50
E82CC-01 Gold Pins Low Microphony Low Noise	£10.50
E83CC-01 Gold Pins Low Microphony Low Noise	£9.50
E88CC-01 Gold Pins Low Microphony Low Noise	£14.50

Golden Dragon Triodes

	Singles	Pairs	Quads
2A3 4PIN	£22.50	£50.00	£100.00
2A3 OCTAL	£22.50	£50.00	£100.00
211	£28.50	£60.00	£120.00
811A	£11.50	£25.00	£50.00
845	£36.50	£75.00	£150.00
805	£36.50	£75.00	£150.00

Golden Dragon 300B Range

	Singles	Pairs	Quads
300B Super	£79.00	£160.00	£320.00
4.300B	£84.00	£170.00	£340.00
4.300B Super	£124.00	£250.00	£500.00

Please enquire of any tube types not listed. We have an inventory of over 2,500 different types in stock.

Golden Dragon Power Tubes

	Pairs	Quads	Octets
EL34/6CA7	£25.00	£50.00	£100.00
EL34L (Laminated EL34)	£29.95	£60.00	£120.00
EL84 (Special Quality EL84)	£12.50	£25.00	£50.00
6L6WGB	£25.00	£50.00	£100.00
KT66	£25.00	£52.00	£104.00
KT88 (New Design)	£57.95	£116.00	£232.00
KT88 Super (Laminated)	£67.95	£136.00	£272.00
*KT88 Special (Gold Plated)	£64.95	£136.00	£272.00
6L6GC	£19.95	£40.00	£80.00
6550A	£42.95	£86.00	£172.00
6550A Special (Gold Plated)	£64.95	£130.00	£260.00
50CA10	£84.95	£170.00	£340.00
807	£25.00	£50.00	£100.00

Ceramic Sockets and Hardware

	Standard	Gold Plated
Locking 4 Pin (300B etc.)	£6.95	£15.00
4 Pin UX4 (300B etc.)	£2.5	£3.50
Jumbo (211 etc.)	£14.50	£25.00
Octal Chassis (EL34 etc.)	£1.25	£3.50
Octal PCB (EL34 etc.)	£1.25	£3.50
B9A Chassis (pre amp)		£2.50
B9A PCB (pre amp)	£0.95	£2.50
Screening Can & Skirt (pre amp)		£8.50
Damping Can (pre amp)		£4.50
Power Valve Retainer (EL34 etc.)		£5.50

High Quality Plastic Scokets and Hardware

B9A Chassis	(pre amp)	£1.15
B9A PCB	(pre amp)	£0.95
Octal Chassis	(EL34 etc.)	£1.25
B7G Chassis	(85A2 etc.)	£0.95
B9A Skirted Chassis Sockeet & Can	(pre amp)	£1.75
Power Valve Retainer	(EL34 EC.)	£1.95

Carriage charge £2.50 on any U.K order. Cash with order or Visa - Mastercard accepted. 24 Hour Answerphone Service.

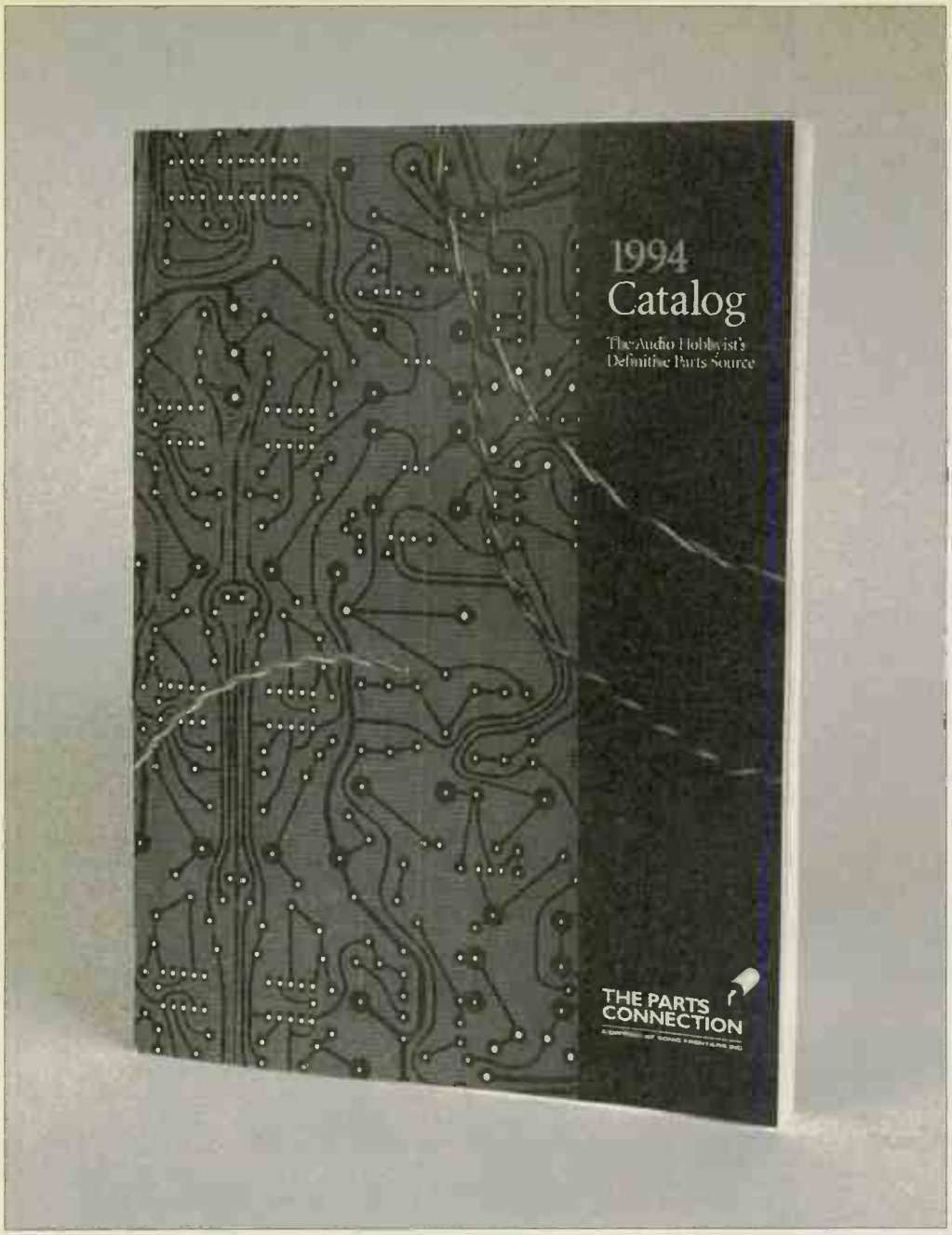
We have a vast range of tubes available from manufacturers all over the world including rare and vintage ypes. A 50 page booklet of valves available is updated monthly and can be provided at a cost of £2.50 per copy including U.K postage or you may telephone our Sales Desk for prompt a quotation.

A selection from our stock of over 2,500 different audio quality valves. Please enquire for items not listed

ECC81	BRIMAR	4.50	LS9B	COSSOR	6.95	6SL7GT	BRIMAR	4.50
ECH81	MULLARD	3.50	M8136	MULLARD	8.50	6SN7GT	BRIMAR	4.50
EC82	GE	4.50	M8162	MULLARD	8.50	6SN7GT	TEONEX	3.50
ECC82	RFT	4.50	M8137	MULLARD	15.00	6SQ7GT	TONEX	4.50
ECL82	TEONEX	3.50	MHLD6	MAZDA	5.50	6V6G	RCA	5.50
ECC83	TEONEX	3.50	OA2WA	TEONEX	3.50	6V6GT	TEONEX	4.50
ECC85	TEONEX	3.50	PCC88	SIEMENS	3.50	6X4	TEONEX	2.50
ECL86	TEONEX	3.50	PL36	MAZDA	3.50	6550A	TEONEX	12.50
ECC88	BRIMAR	4.50	PL504	MAZDA	2.50	12AT6	BRIMAR	2.50
ECC88	GE	5.50	PL509	MAZDA	5.50	12AV6	RCA	2.50
ECC88	TEONEX	4.50	PL519	THORN	5.95	12BA6	WESTINGHOUSE	3.50
EF86	TEONEX	4.50	PY32	MULLARD	2.50	12J5GT	RCA	3.95
EF804S	TELEFUNKEN	25.00	TT100	GEC	65.00	12E1	RCA	3.95
EL32	MULLARD	4.50	U19	GEC	8.50	12E1	STC	15.00
EL85	MULLARD	4.50	UCC85	MULLARD	3.50	13E1	STC	140.00
EL86	MULLARD	4.50	UU5	MAZDA	5.50	13D3	BRIMAR	6.50
EL504	TEONEX	3.50	UU6	MAZDA	6.50	85A2	MULLARD	6.50
EL509	TEONEX	5.50	2X2A	RCA	5.00	1625	RCA	6.50
EL519	TEONEX	5,50	3A/167M	ITT	10.00	5687WA	RCA	6.50
EM84	TEONEX	3.50	5Y3WGTA	SYLVANIA	4.50	5751	RCA	6.50
GZ32	MULLARD	8.50	5V4G	BRIMAR	3.50	5814A	GE	5.50
GZ33	MULLARD	5.50	6AG7	RCA	3.50	5881	USSR	4.95
GZ34	MULLARD	12.50	6A7G	RCA	8.50	6146B	TEONEX	8.50
GZ37	MULLARD	4.50	6BH6	BRIMAR	3.50	6158	BRIMAR	6.50
GZ34	TEONEX	5.50	6C8G	RCA	3.50	6189	SYLVANIA	6.50
KT66	TEONEX	6.00	6DQ6B	PHILIPS	3.50	6201	GE	6.50
KT66	GE	16.50	6K7G	RCA	3.50	6463	UNITED	7.50
						6870	BRIMAR	11.50

EXPORT WELCOME
CARRIAGE AT COST

P.M. COMPONENTS LTD., Springfield Enterprise Park, Springfield Road, Gravesend, Kent DA11 8HD, England
Sales Desk Tel: 0474 560521. Fax: 0474 333762



THE PARTS CONNECTION CATALOGUE

Reviewed by Noel Keywood.

Per head of population, Canada supports a larger hi-fi market than Britain, I was once told. Looking at this highly specialised catalogue, I can believe it. What's more, Canadian enthusiasts seemed more turned onto super-esoterica ('real' hi-fi to some) than the British, if The Parts Connection, "A Division of Sonic Frontiers", is anything to go by.

In their own words, "The Parts Connection is a one-stop audiophile shop". And their definition of audiophile coincides precisely with ours: the catalogue has ranges of highly specialised capacitors, resistors, valve amplifier output transformers, valves, volume controls, connectors, kits, tools, solder and many other items.

Where this catalogue differs from most is in the rarity and speciality of some of the items. For example, we were taken aback to see Teflon capacitors in stock. These are extremely difficult to manufacture, a capacitor supplier told us recently, so they are as rare as thermionic transistors. Mind you, the price of $43 (U.S. Dollars; equivalent to £29 at the time of writing) for a 0.1µF reflects this. Teflon is said to be the best dielectric, however. Otherwise, film-and-foils with a polypropylene dielectric rate highly, which The Parts Connection also stock. There are no Black Gates, but they do have Mallory electrolytics and at $10.25 (£6.92) for a 100µF/450V (525V surge) they are competitively priced.

Resistors include Vishays and Holcos, but there are plenty of other makes too. Magnequest output transformers for single ended 300B amps and general purpose push-pull useage are stocked, but insufficient information is given to apply them optimally. Further info. would be needed.

Tested valves like Golden Aeros are listed, as are new old types. The Parts Connection also stock, to a limited degree, specialised solid state devices. This is an area that could beneficially be expanded I feel, because semiconductors could well benefit from greater specialisation of design toward audio useage, supportable by higher audiophile pricing. But then, that's for the chip fabricators to consider; operations like The Parts Connection might well stimulate this.

Canada? Yep. There is a lot of water between them and us, but they're fully geared for overseas orders, with answerphone and fax. First class air mail or UPS (C.O.D. if wanted) will keep UK-bound parcels dry and payment can be made by money orders (US dollars), bank transfer for large amounts, American Express, Visa and Mastercard. Delivery times are 7-10days approx., but it's always best to check availability first.

Contact The Parts Connection at -

2790 Brighton Road,
Oakville,
Ontario,
CANADA L6H 5T4.
Tel: 0101-905-829-5858
Fax: 0101-905-829-5388

The 96page A4-size catalogue costs $5, but offers a $10 discount against the first order over $100. Britain is 5 hours ahead, so 'phone 3pm-10pm to speak direct. At the time of writing exchange rate was $US1.48=£1.

Seas Loudspeakers

Seas P21REX

At SEAS, we take pride in working according to the highest standard. we put a lot of effort into speaker design, using materials and techniques which give the best audible results even if this means time consuming and painstaking production processes. Many critical parts are produced in-house some of which made by special purpose machinery designed and built by Seas Quality is a key word in every aspect of our activity. We monitor the quality of the parts and materials which we purchase, and of the parts and operations made in-house. We use sophisticated equipment and highly trained and experienced personnel to check that our finished products meet their specifications.

U.K. Trade Distribution:
Radio Components Ltd., 428 Whippendell Road, Watford, Herts.
Tel: 0923 - 250665 Fax: 0923 - 250188

A.R.M.S.

ACCOUSTIC RESPONSE MEASURING SYSTEM

Just imagine, with a few touches of a keyboard, being able to measure the Thiele-Small parameters, complete with impedance curves and S.P.L., of a loudspeaker drive unit, and then being able to measure the frequency response of a correctly designed speaker system, based on these parameters.

With **A.R.M.S**, all this, and more, is possible. **A.R.M.S** is not a kit. The package includes the hardware, housed in a 19" case, together with the software and microphone. **A.R.M.S.** is suitable for use on IBM PCs (or true compatibles) with MS-DOS 3.2 or higher.
Further details are available upon request.
PRICE (inc. U.K. delivery): £425.00 + £74.38 VAT.

B.K. ELECTRONICS
Units 1,3 & 5 Comet Way,
SOUTHEND-ON-SEA, Essex, SS2 6TR.
Tel.: 0702-527572 Fax: 0702-420243

WHY BUY A NEW C.D. PLAYER ?

When you can transform the performance of your existing C.D. player, with the award winning DIGIT the D.A.C. at a truly incredible price of only £139.00 + £19.00 for the DIGIFLEX interconnect cable.

To quote Audiophile magazine, " its effect is remarkable. Add the Digit and the performance of the MARANTZ CD 52 SE which is already excellent for its price, leaps one stage further towards the magically true to life transparency of two box players costing £1000.00 or more.

In recent What Hi Fi ?, Audiophile and Hi-Fi Choice awards, Digit beat products costing 2 or 3 times the price - so don't be fooled in to paying more, it's not necessary.

To obtain DIGIT, with a money back guarantee, please telephone (0276) 451166 or complete the coupon below.

WHAT HI-FI? Recommended 1992 CD UPGRADE

AUDIOPHILE for excellence AWARDS

Please send more information on DIGIT including the POSITRON Power supply upgrade and dealer list.
I enclose a 1st class stamp
NAME _____
ADDRESS _____
POSTCODE _____

QED

BASS POWER!

Here are thirteen of the best known ten and twelve inch bass units, ranging from £30.50 to £185 each.

To measure the frequency response of the bass units, we used a huge baffle, achieved by mounting each driver in a doorway between two rooms. The frequency plots show how low bass will go naturally on such an open baffle, but bear in mind that with units that are amenable to the effect, bass will be extended down by the cabinet, eg. the Beyma reaches 72Hz on the open baffle, but 34Hz in a cabinet.

The high Q (0.37) bass units are best suited to sealed enclosures, and their bass response in a box will not go lower than on the open baffle. Lower Q units can be used in a reflex enclosure, where the bass response can be forced downwards by the port.

Other areas that are important to how the bass unit will perform are sensitivity and BL factor. Make sure that if you decide to use one of these bass units that it is sensitive enough to keep up with the midrange and tweeter units you have chosen, else they'll have to be attenuated, which is a waste. The higher the BL factor is, the harder the bass unit will push outwards for a given input. So a high BL factor will give good clean bass, with low distortion.

A simple second order filter is all that you're likely to need to roll off the midrange from these units. Pick the frequency you want to use the bass unit up to, say 200Hz, and then use the impedance curve to give you a value for R. This value can then be inserted into the equations below to give a value for the inductor and capacitor.

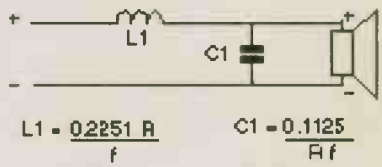
Most of the units can be used right up to 1kHz, but some can be seen to break up lower down. This break-up can be clearly seen, and they should not be used above this point.

To see what they could actually do, I ran all of the units through a computer box designer. I fixed the volume at 100litres, about the size of a large floorstander. This gives you an indication of how low the bass unit will go in a given box size, making comparison easier.

The bass units in this test are available from:
The Speaker Co. Unit 9, Waterside Mill, Waterside, Macclesfield, Cheshire.
Tel: 0625 500507

Richard Allan Audio Ltd, Bradford Rd, Gomersal, Cleckheaton, W. Yorks.
Tel: 0274 869935

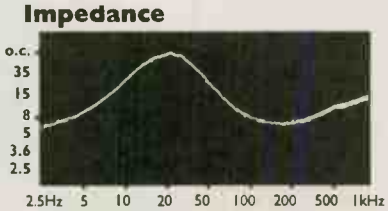
Beyma bass units available from:
LMC, Unit 10, Acton Val Industrial Park, Cowley Rd, London.
Tel: 081 743 4680



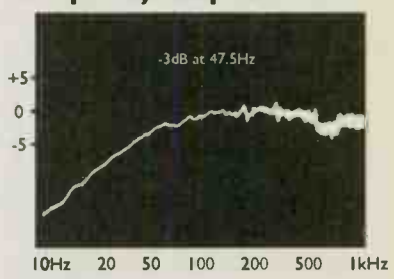
AUDAX HT240M0 £30.50

Audax's HT240M0 is a 10inch bass unit with an undoped paper cone. Sensitivity is high at 92dB, making it suitable for most midrange units and tweeters. It is best suited to reflex loaded enclosures, reaching 37Hz in a 100 litre box with an 80mm diameter, 71mm long port.

Impedance



Frequency Response

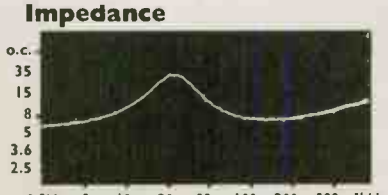


Fs	28Hz	Qms	1.78
Sensitivity	92dB	Qes	0.48
Power Handling	80W	Vas	0.21m3
Mms	0.024Kg	Re	6.3Ω
BL factor	7.4Tm	Sd	0.034m3
Qts	0.38	Baffle Cutout	222mm

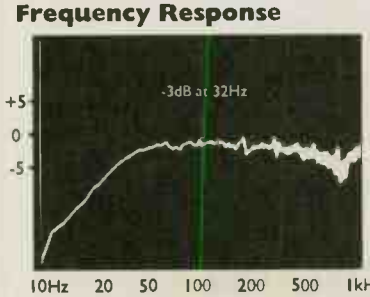
MOREL MW1075 £52.89

Morel's 10inch MW1075 damped polymer cone bass unit is best suited to sealed enclosures, reaching down to 34Hz in a 100 litre cabinet. It is only 89dB sensitive so efficient midrange units and tweeters will have to be attenuated to match.

Impedance



Frequency Response



Fs	25Hz	Qms	2.5
Sensitivity	89dB	Qes	0.87
Power Handling	180W	Vas	0.178m3
Mms	0.028Kg	Re	6.4Ω
BL factor	5.9Tm	Sd	0.0324m3
Qts	0.65	Baffle Cutout	235mm

BANDOR

Miniature Loudspeakers

The sound of excellence

BANDOLINE 20 and BANDOLINE 30

Transmission line kits designed to exploit the unique acoustical performance of BANDOR musical loudspeakers which are the product of 35 years experience. Anodised, curvilinear aluminium cones are assembled by hand into robust chassis fitted with powerful magnets. Long-throw, low distortion bass drivers for clean deep bass. Complementary treble section with fast transient response and wide bandwidth, allowing low crossover point - below 200Hz. Drivers are fully tested before despatch.

Free technical details and prices from

Bandor
Design and Development Studio
11 Penfold Cottages
Penfold Lane
Holmer Green
Bucks HP15 6XR
Tel. &Fax (0494) 714058

Assembled
Bandorline 30
30Hz -20KHz
size
48 x 13 x 8.5 in
122 x 33 x 21.16 cm

Wilmslow Audio

As any discerning sound engineer will tell you, the ATC SCM50 and 100 are the ultimate in accurate low distortion professional monitoring. But what they may not know is that self assembly versions based on these classic monitors are now available from the UK's leading speaker kit supplier, Wilmslow Audio, at a fraction of the ready built price. ATC and Wilmslow Audio have worked very closely on the cabinet and crossover design to ensure that the completed kit lives up to the very high standards associated with the ATC name. As with all Wilmslow products, the ATCK50 and K100 kits come complete with precision machined cabinet panels, crossovers, and all necessary hardware, including factory matched ATC drivers. Cabinet parts are machined from high grade MDF for easy assembly and consistent acoustic performance. ATC's MK I Tri-Amp Pack systems are available as an option if required.

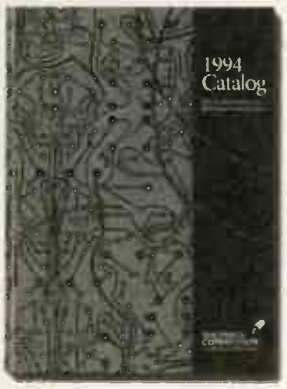
The Result . . .

- *Stunning accuracy and clarity*
- *Clean well damped bass*
- *Smooth detailed treble*
- *Totally transparent mid range*
- *No overdraft!!!*

If you aspire to the unrivalled quality of ATC monitoring, but are working to a tight budget, contact Stephen Leigh who will be pleased to tell you exactly how economical these kits are. ATCK50s and 100s are on demonstration by appointment.

Wilmslow Audio Limited, Wellington Close, Parkgate Trading Estate, Knutsford, Cheshire, WA16 8DX, England. Tel: (0565) 650605 Fax: (0565) 650080

To make the most of your projects, start with the right tool.



Get connected with the widest selection of audiophile grade parts. Send £3* along with your mailing address and you will receive our 1994 parts catalogue and a $10 discount** coupon good on your first order over $100.

THE PARTS CONNECTION
A DIVISION OF SONIC FRONTIERS INC

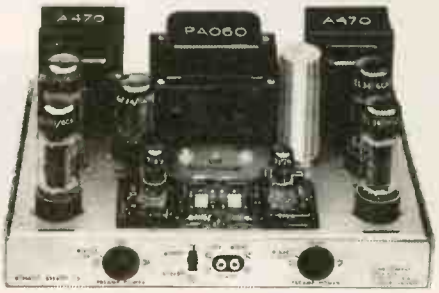
*or $5.00 US, or credit card information
**catalogue pricing and discounts are in US Dollars

2790 Brighton Road, Oakville Ontario, Canada L6H 5T4 Tel: (905) 829-5858
Toll Free Order Line 1-800-769-0747 (U.S. & Canada only) Fax: (905) 829-5388

MIT MultiCap • Wonder Cap • Kimber Kap • Solo • Solen • Siemens Hovland MusiCap • Wima • Holco • Rel-Cap • Draloric • Vishay • Caddock • Mills Matsushita • TKD • Noble • Cardas • Kimber Kable • Discovery • Audioquest • MIT ClearAudio • Alps • Bourns •Shallco Attenuators • Elma • Electroswitch • Nichicon Gold Aero • RAM • Mallory • Ruby Tubes • Edison Price • Linear Technology Motorola • Analog Devices/PMI • International Rectifier • MagneQuest • Pearl Sonic Frontiers • Tube Sockets • WBT • Neutrik • Curcio Audio Engineering • Kits

VINTAGE VALVE

DYNACO STEREO-70



This is one of the most famous American tube amps ever made. Rated at 35 watts per channel, it uses 4-El34's, 1-GZ34, and two 7199's. This very reliable amp is great for those who wish to modify parts or use it just as it is. Bias is easy to adjust, and the unit can switch between mono and stereo. The output tubes can operate at 65% of their capacity, and the filter caps at less than 85% of their rated voltage. A true classic.

Dynaco, Sherwood, Scott, The Fisher, McIntosh, Eico, Harman-Kardon, Heath, Altec, Stromberg-Carlson

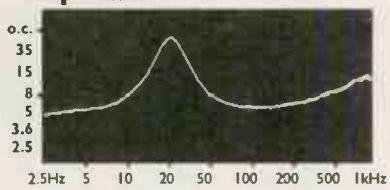
Prompt Insured Delivery. Vintage Parts Available on Request
Looking for a particular piece of vintage equipment ?
Send Us Your Requests.

FAX: (604) 876-5876
P.O. BOX 147, STATION A, VANCOUVER, B.C.
CANADA V6C 2M3

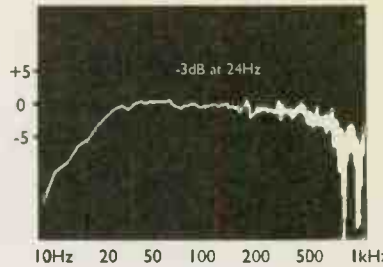
MOREL MW1275 £69.33

We quickly named this unit the frisby, it is lightweight and has a very small magnet. However it managed to get down to 30Hz in a 100 litre sealed box, which is very reasonable. Sensitivity of this 12inch DPC coned unit is high enough for use with the majority of mid and treble units.

Impedance



Frequency Response

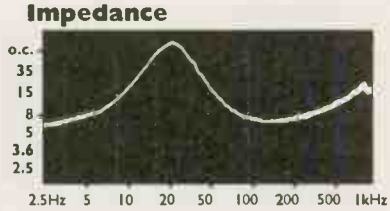


Fs	22Hz	Qms	3.8
Sensitivity	90dB	Qes	1.0
Power Handling	250W	Vas	0.27m3
Mms	0.055Kg	Re	6.4Ω
BL factor	5.4Tm	Sd	0.0503m3
Qts	0.8	Baffle Cutout	266mm

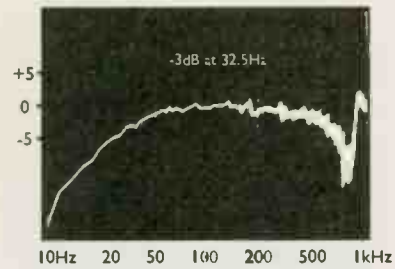
KEF B139 £135

An old favourite this one, I found the B139 worked best in a reflex enclosure reaching down to 30Hz in a 100 litre box with an 80mm, diameter by 120mm long port. Sensitivity is drastically low though, so most mid and treble units will have to be attenuated to match.

Impedance



Frequency Response

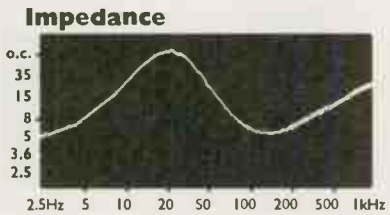


Fs	25Hz	Qms	6
Sensitivity	87dB	Qes	0.39
Power Handling	100W	Vas	0.127m3
Mms	0.054Kg	Re	7.2Ω
BL factor	12.5Tm	Sd	0.0349m3
Qts	0.37	Baffle Cutout	template

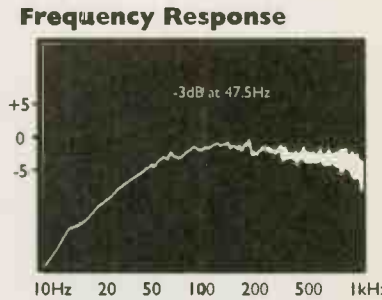
VOLT B250.8 £108

The VOLT B250.8 is massively built. A low Q makes it suitable for reflex enclosures and in a 100 litre box it reached down to an impressive 27Hz with an 80mm diameter, 166mm long port. The sensitivity is a little low, so partnering units may have to be attenuated.

Impedance



Frequency Response

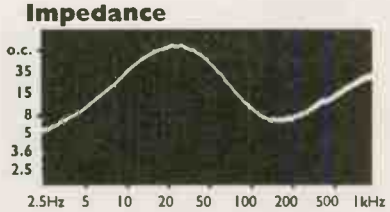


Fs	24Hz	Qms	2
Sensitivity	89dB	Qes	0.35
Power Handling	150W	Vas	0.126m3
Mms	0.044Kg	Re	5.9Ω
BL factor	10.6Tm	Sd	0.0289m3
Qts	0.3	Baffle Cutout	253mm

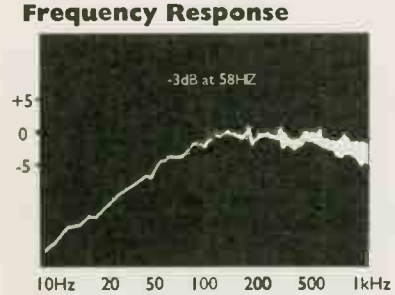
VOLT B2500.1 £185

The even lower Q of the B2500.1 means that this unit gets down to 24Hz in a 100 litre reflex enclosure with an 80mm diameter, 181mm length port. It's sensitive enough to work with the majority of partnering units, and the high BL factor should ensure strong, clean bass.

Impedance



Frequency Response

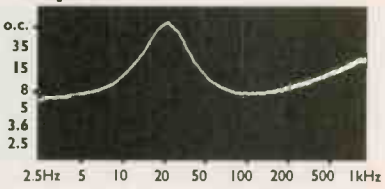


Fs	25Hz	Qms	1.4
Sensitivity	90dB	Qes	0.25
Power Handling	250W	Vas	0.051m3
Mms	0.11Kg	Re	5.9Ω
BL factor	20.3Tm	Sd	0.03m3
Qts	0.21	Baffle Cutout	253mm

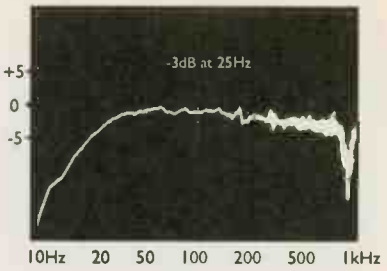
RCF L10/020 £32.05

Even though the L10/020 has a high Q, I found lowest bass came from a reflex enclosure. In a 100 litre cabinet with an 80mm diameter, 163mm length port, it reached down to 27Hz. Sensitivity is very low though, most midrange units and tweeters will have to be attenuated.

Impedance

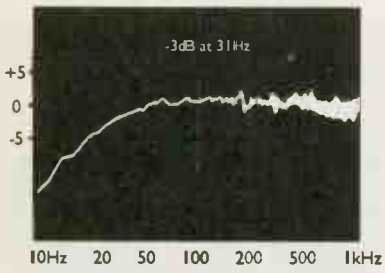


Frequency Response



Fs	30Hz	Qms	4
Sensitivity	87dB	Qes	0.8
Power Handling	70W	Vas	0.09m3
Mms	0.02Kg	Re	7.2Ω
BL factor	6Tm	Sd	0.0333m3
Qts	0.64	Baffle Cutout	235mm

Frequency Response



Fs	20Hz	Qms	12
Sensitivity	90dB	Qes	0.35
Power Handling	100W	Vas	0.25m3
Mms	0.028Kg	Re	5Ω
BL factor	7.1Tm	Sd	0.0284m3
Qts	0.34	Baffle Cutout	231mm

The L10P10-1 has higher sensitivity than the L10/020, making it suitable for a wider range of partnering units. The soft fibrous cone should give a good sound, and bass went low, 29Hz in a 100 litre refflex enclosure - port 80mm diameter, 163mm long.

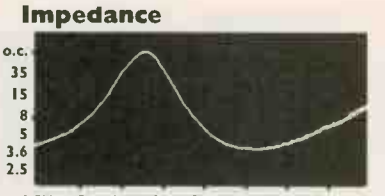
Impedance

RCF L10P10-1 £55.14

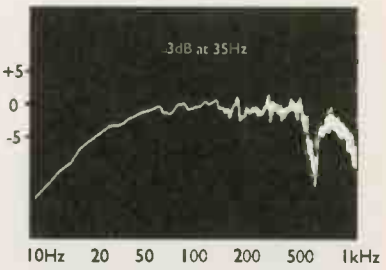
RCF L12P48 £87.89

The 12inch RCF reached down to 28Hz in the 100 litre reflex loaded cabinet, with 80mm diameter, 202mm length port. Its sensitivity isn't very high, so partnering units will likely have to be attenuated. It is, however, a well made and powerful bass unit for the price.

Impedance

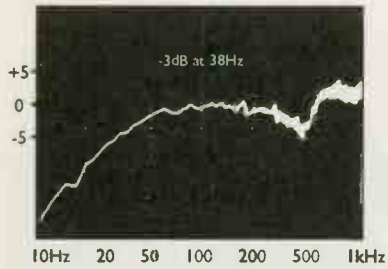


Frequency Response



Fs	19.5Hz	Qms	10
Sensitivity	89dB	Qes	0.44
Power Handling	150W	Vas	0.27m3
Mms	0.08Kg	Re	5Ω
BL factor	10.5Tm	Sd	0.0483m3
Qts	0.4	Baffle Cutout	226mm

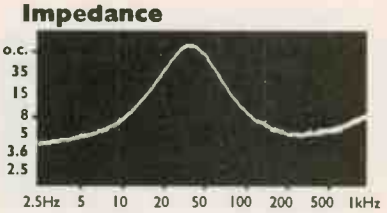
Frequency Response



Fs	26Hz	Qms	3.8
Sensitivity	91dB	Qes	0.24
Power Handling	100W	Vas	0.175m3
Mms	**Kg	Re	5.8Ω
BL factor	6Tm	Sd	0.035m3
Qts	0.23	Baffle Cutout	228mm

The SEAS 25F-EWRX is a good all rounder combining high sensitivity and power handling with a low Q, which will give deep bass. It reaches 35Hz in a 100 litre box, port being 80mm diameter, 71mm long and the doped paper cone should give a smooth sound.

Impedance

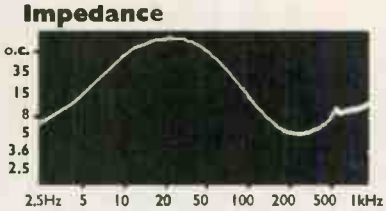


SEAS 25F-EWRX £41.22

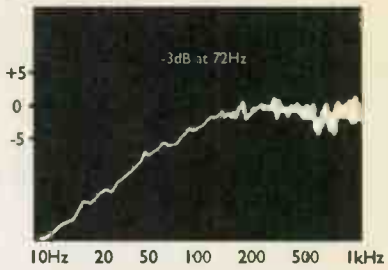
BEYMA 12B-100/R £157.69

This beautifully built 12 inch paper cone unit has a lot going for it. High sensitivity and BL factor should give powerful, clean and loud bass. The low Q also helps it to reach 34Hz in a 100 litre reflex enclosure tuned with an 80mm diameter, 85mm length port. Good, even at the price.

Impedance

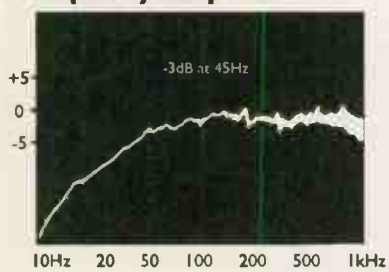


Frequency Response



Fs	23Hz	Qms	6.42
Sensitivity	96dB	Qes	0.175
Power Handling	150W	Vas	0.275m3
Mms	0.067Kg	Re	6.1Ω
BL factor	18.5Tm	Sd	0.053m3
Qts	0.17	Baffle Cutout	286mm

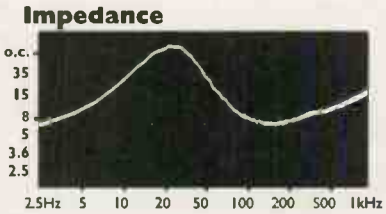
Frequency Response



A 10inch polypropylene unit this one, and with reasonable BL factor and low Q. The B10CVH went down to 32Hz in a 100 litre reflex enclosure, port dimensions - 80mm diameter, 88mm long. Sensitivity is high enough to suit most midrange units and tweeters, and it is well priced.

R. ALLAN B10CVH £52.83

Impedance

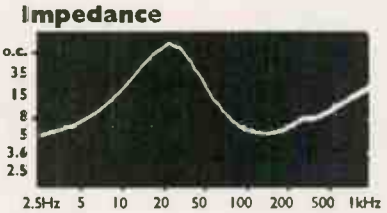


Fs	30Hz	Qms	2.63
Sensitivity	90dB	Qes	0.31
Power Handling	100W	Vas	0.11m3
Mms	0.0308Kg	Re	6.8Ω
BL factor	11.28Tm	Sd	0.03m3
Qts	0.28	Baffle Cutout	232mm

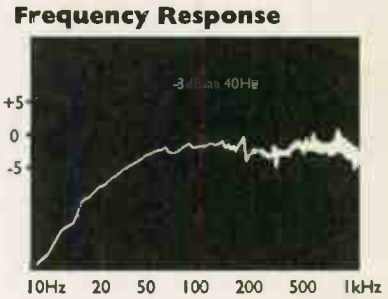
R. ALLAN B12CVS £68.86

This 12inch Richard Allan polypropylene cone unit doesn't go as low in a 100 litre box as the 10inch, because of its higher Q. Ultimately it will, but in a much larger cabinet. With an 80mm diameter, 45mm length port the B12CVS got down to 45Hz. Better power handling though.

Impedance



Frequency Response



Fs	28Hz	Qms	4.97
Sensitivity	90dB	Qes	0.38
Power Handling	200W	Vas	0.33m3
Mms	33.13Kg	Re	6.3Ω
BL factor	9.74Tm	Sd	0.05m3
Qts	0.33	Baffle Cutout	273mm

CONCLUSION

The good all rounders are those with high enough sensitivity to match the majority of midrange and treble units, and good low bass performance from the 100litre cabinet. This includes: Audax's HT240M0, Morel's MW1275, VOLT's B2500.1, RCF's L10P10-1, SEAS's 25F-EWRX, Beyma's 12B-100/R and Richard Allan's B10CVH. All of these are above 90dB sensitivity and reach down below 40Hz, low enough to play bass fundamentals properly. The others are either not sensitive enough for general use, or didn't get below 45Hz.

Of these seven, the Audax HT240M0, RCF's L10P10-1, SEAS's 25F-EWRX and Richard Allan's B10CVH stand out as being best value. The home constructor should not only find these affordable, but will get good deep bass and high sensitivity.

If money is no object, this leaves three, of which I must say the Morel MW1275 looks the weakest. Its low BL factor and tiny magnet suggest bass quality and power handling will be suspect. The beautifully made and engineered Beyma 12B-100/R and VOLT 2500.1 are the most expensive in the group, but what you get is a combination of high sensitivity, low Q for good bass in a reasonably sized cabinet, and massive BL factor, which will ensure that bass is not only loud, but powerful and clean ●

D.I.Y. Letters

10W CLASS A TRANSISTOR DESIGN

In the light of the recent introduction of kits for valve amps I feel it worth mentioning a transistor design for a 10 watt pure Class A design by J. Linsley-Hood that appeared in Wireless World (April 1969, October 1969 and December 1970). The latter two articles are relating to refinements. This amp was built on a single tri-pad board, with the output transistors on a suitable heat sink. In addition to the original design a choke smoothed power supply was used.

In use this amplifier feeds LS3/5as and is open and punchy in sound with delicate music (e.g. Rory Block) and good vocal recordings, being so involving that I prefer its sound to some of the valve designs that have passed through my hands (perhaps this is just a personal choice). I do feel, however, that this amp provides a very affordable intro to Class A and would make a suitable kit.

As regards pre-amps, the one in use is also from Wireless World, this time a design by Doug Self published on October 1983. In place of the suggested NE5532/4 originally specified I have used OP275GP op amps from Analogue Devices which give a smoother and better controlled sound with improved bass (not volume, but quality). This pre amp has a very well designed phono stage, which seems to be a rarity these days.

Just a note on output power: 10 watts into LS3/5as is enough to fill a Victorian 2 up 2 down. So the amp should be adequate for most normal use.

The rest of the kit includes a Rega Planar 3, NAD 5420 and a tampered with geriatric Pioneer tape deck.

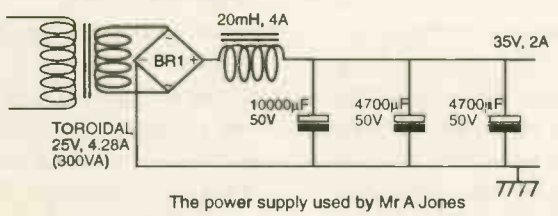
Keep up the good work with kits etc.

A Jones
Southville,
Bristol.

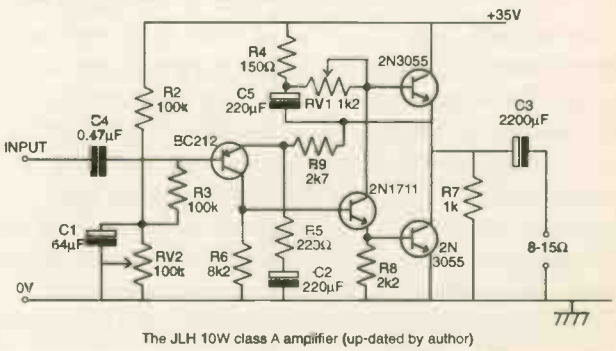
We are looking into designing a low powered transistor amplifier at the moment, although it will be some time before it appears in the magazine. What we hope to be able to do is offer a 10-15w single-ended or push-pull transistor design with very low, or preferably no feedback, at a reasonable cost. The components will almost certainly be cheap, but the mains transformer and heatsinks needed will account for most of the cost. However, at the moment we are up to our necks production engineering the other designs that we have published over the last year. So it will be towards the end of '94 at the earliest before such a design appears. **DB**

300B KIT QUERY

Your recent design and project for a 300B push-pull amplifier is very interesting. The design seems to have many excellent features and to offer the promise of very good sound quality. I am aware that any amplifier design is the outcome of a complex process of trade-offs and on the whole the 300B amplifier represents a well chosen combination of compromises. Even so there are perhaps a number of points where the design might perhaps be changed for the better or modified successfully. I would



The power supply used by Mr A Jones



The JLH 10W class A amplifier (up-dated by author)

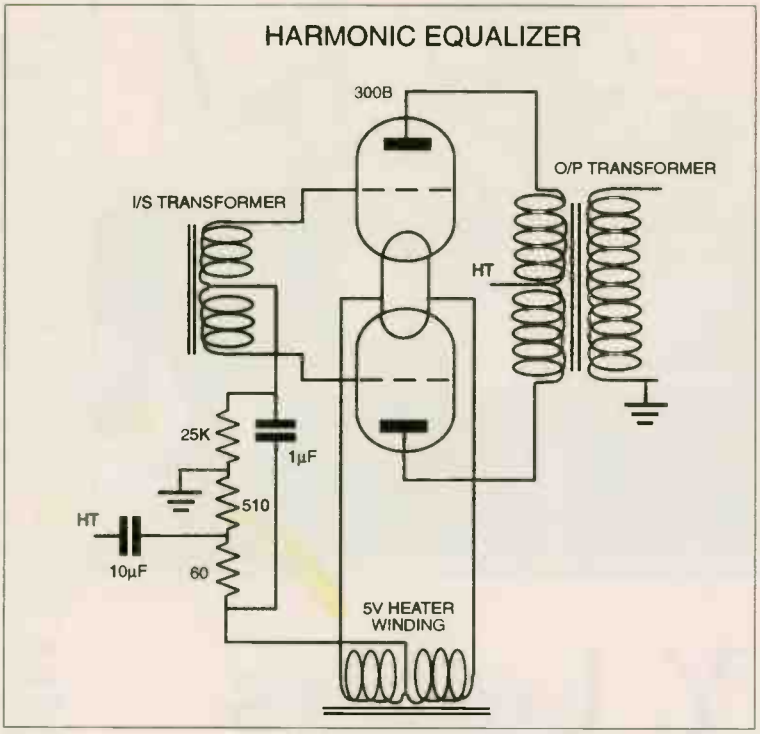
Circuit reproduced with kind permission of J. Linsley-Hood

be interested to have your comments on the following points.

1. Firstly I do approve of the use of a interstage coupling transformer in the place of a phase-splitter arrangement. But what I do find somewhat surprising is the absence of any arrangement for balancing the output valves. Even very highly specified valves like the 300B can show power variations in the region of 7-10% when new and it would seem obviously desirable to include in the circuitry a means of balancing the output pair.

2. Secondly, I am wondering if consideration was given to the use of the Western Electric 310A valve for the voltage amplification stage. This valve was produced as a high gain voltage amplifier for driving the 300B and its use in your design would eliminate one of the two stages of voltage amplification. The elimination of a whole stage of amplification would seem an obvious benefit. I am aware that arguments are frequently advanced in favour of all-triode amplifiers but the 310A is a very special valve designed to give high gain while meeting the exacting Western Electric standards for low distortion.

3. I have acquired some Western Electric application notes for their amplifiers and theatre systems and I have been much impressed by the thoroughness and sophistication of their investigations into the problems of high fidelity sound in theatres. Some time ago I acquired a Western Electric 1086 amplifier. While this had been converted in the 1960s from a 300B output stage to a 6L6 output stage, most of the original circuitry and components remained.



The Harmonic Equalizer - a circuit for reducing odd order harmonic distortion

Included in the circuit was a curious arrangement of cathode resistors for the output stage. Recently I came across an article in the International Projectionist for December 1936 which gave an explanation for the arrangement. The Western Electric Company referred to the arrangement as a 'Harmonic Equaliser'. What follows is an abbreviated version of their description.

"The purpose of the 'Harmonic Equaliser' is to remove harmonic distortion without using feedback. While even order harmonic distortion is removed by the usual device of the push-pull output stage, third and other odd-order harmonics are removed by the action of the 'harmonic equaliser'. The 60ohm resistor and 16µF capacitor are in series with the return from the centre tap of the primary of the output transformer to the filaments of the output tubes. The second and even order harmonics cannot manifest themselves in the primary of the output transformer where they meet out-of-phase and cancel, but commonly appear as voltage in the return between the centre tap of that primary and the output valve filaments. They also appear in the space of the output valves themselves. The very low impedance of 60ohm in series with 16µF prevents the even-order harmonics from developing any appreciably large voltage drop in the filament-to-primary-centre-tap lead, and thus concentrates them almost entirely in the space of the valves. But in the valves they react with the fundamental frequency to produce third- and other odd-order harmonics which are 180 degrees out-of-phase with the odd-order harmonics already present there."

The result is, according to Western Electric, that odd-order harmonics are cancelled in the valves themselves by the generation, within those valves, of the identical harmonic frequencies in reverse phase. Western Electric go on to say that the 60ohms is a critical value. For other values the third harmonics generated in the valves would be either too weak to cancel the original harmonics or too strong and thus add to the distortion.

I have never seen another version of this unusual circuit and I can't find any mention of it in the Radiotron Designer's Handbook (Radio Designers Handbook in the UK). It is an interesting example of the Western Electric engineer's efforts to build low distortion amplifiers in the 1930s.

I would also like to take the opportunity to point out that polypropylene capacitors with working voltage ratings of 900V and values of 25, 32 and 50 µF are manufactured in Australia by Plessey Australia. These are high pulse grade capacitors intended for electric fence power pack applications and their high working voltage rating makes them eminently suitable for valve amplifier power supplies. They are also very cheap and I am a very satisfied user of them.

John Rivers
Palmerston North,
New Zealand.

Balancing the output valves only serves to eliminate low order harmonic content, which is subjectively not intrusive. With my modifications to the 300B amplifier driver stage (Ed. note: in development for production kit form, Andy Groves has altered and refined our 300B amplifier, but we have not published details yet) design distortion is in the region of 2% at max output without A.C. balancing and 0.2% with it, both with zero feedback. We carried out listening tests here and found that sonically the two performances were all but indistinguishable. The valves will be reasonably balanced in anode currents because of the cathode biasing (auto-bias) used.

The 310A pentode + 300B triode + 274B rectifier is the classic circuit used widely in Japan and France, but 310As are very rare and expensive. Using a single gain stage has both advantages and disadvantages, as one valve is asked to do the job of voltage amplification and driving the output stage. The 5687 valve now used to drive the 300Bs in the kit is just about the most linear valve available for this purpose, considerably more linear than a 310A.

The "Harmonic Equalizer" circuit is interesting, but it will have problems because of the valve variations you mentioned. Cancellation circuits like this need to be set up with accurate test gear and have a tendency to drift with time, hence the popularity of feedback which eliminates a lot of these problems. Western Electric used feedback, along with everybody else, to improve the figures of their amplifiers, but nowadays it tends to be used as a "magic bullet" to cover up terrible faults in the open loop performance.
Andy Groves

PENTODE AS TRIODE?

It is with great interest that I follow your DIY projects and I have some comments and suggestions which I hope will prove of interest to yourselves and to constructors.

I was never a fan of the original Mullard 5-20 and converting from pentode to triode input stage has been an acknowledged modification for many a year to the Mullard and other (i.e. Radford) designs. With the K5881 it is interesting to note that you have followed this path, which I am sure provides a worthwhile improvement, BUT why codge up a pentode to act as a triode? A strapped pentode never seems to perform like the genuine article, still being prone to parasitic oscillation, hence your grid stopper resistor. Good triodes are readily available, the ECC83 being a logical choice.

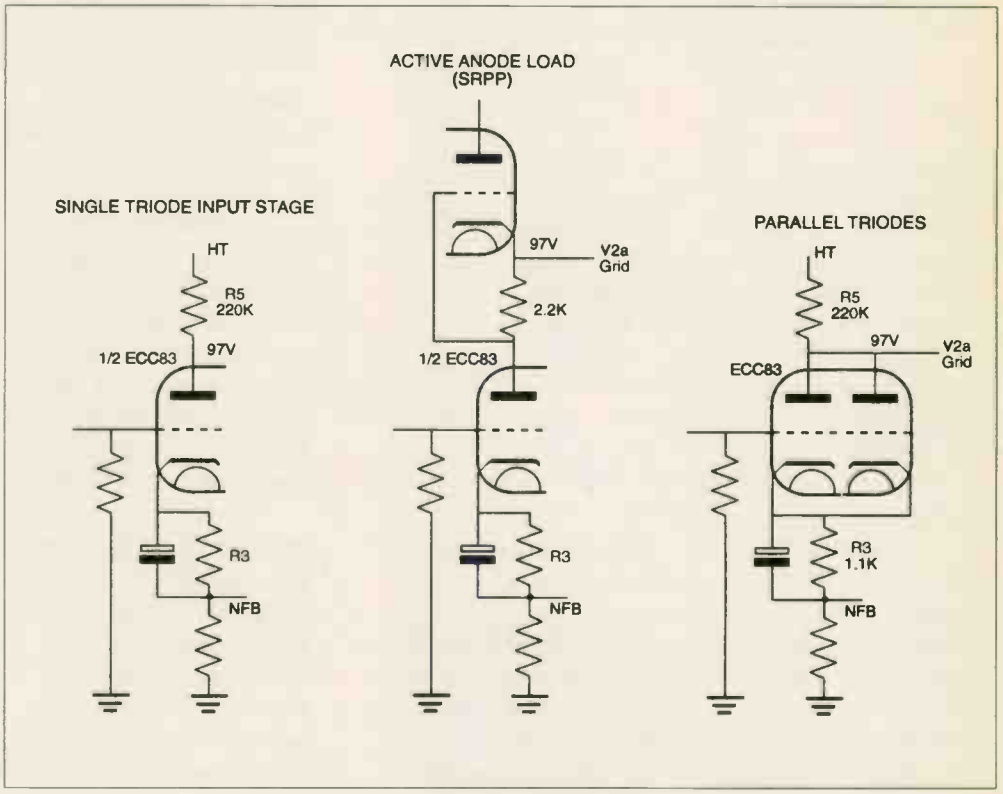
Your tagboard construction method is a good idea. It has an advantage in making experimentation and modification easy. One half of an ECC83 will work well if the anode load resistor R5 is increased to 220K and the HT voltage adjusted to maintain V2a grid at 97 volts. This leaves a spare triode unit which it seems a shame not to use. The two triode units can be connected in parallel for lower impedance. If this is done R5 may stay at 110K but the bias resistor R3 will need to be half its present value, easily achieved by connecting another 2.2K resistor directly across the existing one. It is easy to give this a try by just re-wiring the valve holder and adding one resistor.

Alternatively the spare triode could be used as an active anode load which holds the promise of low distortion, low output impedance and high gain. I have found this arrangement to be highly satisfactory, as have some commercial amplifier producers. The top triode forms a constant current source and uses only one resistor along with the triode. This resistor can be mounted directly on the valve holder and again this circuit can be incorporated with very little effort. These circuits are suggested for experiment and are shown on the enclosed sheet.

By providing mounting holes on the front panel and additional mounting holes on the rear panel the constructor would have the option of building in a volume control and, if required, an input selector with the necessary sockets, thus greatly adding to the versatility. Blanking plugs would deal with the holes for those who do not require them. Both K5881 and 300B could benefit from this.

The 300B circuit looks interesting. I do not like sharing double triodes between channels since my practical experience has shown that stereo presentation is always better when both channels are physically separate, not possible when sharing valve halves. This does not seem to be reflected in measured crosstalk figures, however it is plainly audible. This circuit is not as original as you seem to think, I have seen a cinema amp probably built around 1937-39 which employs the same circuit with octal valves in the driver, but not tertiary feedback. Apart from some minor differences to component values and, crucially, the quality of the transformers, the circuit is practically identical. This basic circuit was quite widely used and proved to be a consistent and highly reliable design. In the August supplement, under "Theory of Operation" Tim de Paravicini states that about 400 volts peak-to-peak is available from the driver transformer. This seems a little excessive for 300Bs but it should be just about right to drive a single 845 - now there's a thought!

In the 300B Part 2 article (October supplement, page 22) it is stated that transformer cores should be electrically isolated from the chassis. This is dangerous rubbish. Mains transformer primaries are generally wound on nearest the core, so clearly a fault here could result in the ▶▶



Three different input circuits that could be used on our K5881 amplifier.

core becoming live. With the core mounted so close to earthed metalwork, and exposed, the danger is obvious.

The situation with output transformers can be even worse, since the full H.T. voltage could appear on the core. The very idea makes me shudder. It is usual when designing signal transformers to assume that the core will be earthed and transformer capacitances are usually calculated making this assumption. To float the core will change these capacitances and the transformer may not perform as intended. Safety must be our first priority and all exposed metalwork must be earthed.

I feel that you must have misinterpreted the function of the fibre washers which is to prevent the bolts from acting as shorted turns, lowering inductance and causing losses. They should isolate only the ends of the bolts and not the whole core; this is the true function of the washers.

How about making your transformers available separately, rather than in sets? Should I decide, say, to scratch build K5881, for instance, I already have mains transformers and chokes which would be suitable, so only output iron would be required. Likewise, should I decide to substitute an 845 single-end stage for your 300B push-pull as suggested earlier, then the mains and output transformers would not be required. There are a number of circuits from Japanese constructor magazines which call for a driver transformer for which yours would be quite suitable. There could be a healthy demand for these since driver transformers are difficult to obtain.

Where can we get to hear these designs? Your magazine, along with others, quite rightly advises readers to audition equipment before buying, but this is an obvious difficulty with DIY. I know you exhibited at the Penta show but that's only once a year and 180 miles away from here. Show demonstrations can only give one a general impression anyway.

I am tempted by the high definition design recently published, but I have doubts. This is not a complicated project and I am confident that I can build it to plan and that it would perform as you intended. What deters me is that I might not like it. After all, loudspeakers remain very much a matter of taste. Surely I am not alone in this? It is a stumbling block to DIY and building without audition makes even less sense than buying without audition except to the inveterate experimenter. Can anything be done about this?

David Dick
Stockport,
Cheshire.

PS: Golden Dragon valves that I have used sound great when they are new but they just don't last. My letter of complaint to P.M. Components did not even elicit a reply!

Andy Groves says:

The EF86 is an excellent valve, triode or pentode connected. It is very linear and has low noise, low microphony, internal screening and a spiral wound heater to cut down on hum. For these reasons Noel chose to use it when he originally designed the K5881. The grid stopper on the input is essential, and should be present no matter what type of input valve is used. The fact that the input on K5881 is a triode connected pentode makes no difference and I would say that you have been lucky not to experience tweeter vaporizing parasitics yet, especially when you get a bad earth or faulty input connector.

Your ECC83 modifications are worth a try for experimenters, but I would like to point out that the SRPP circuit is not quite the cure-all it seems. Firstly, problems occur when the cathode of the load valve is elevated above the heater by more than a few volts. This usually shows itself by valves becoming severely microphonic after a few weeks (or even days) of use, so the heater winding must be biased up from ground by +45 to +55 volts D.C. Secondly the linearity of this type of circuit is dubious. If the transfer function of the combination is plotted, it is S shaped like a pentode and weird kinks show up near the A.C. zero crossing point unless care is taken when setting quiescent currents and operating voltages.

The load valve in the standard SRPP circuit does not function as a constant current source because there is not enough feedback associated with its cathode resistor. As you have drawn it, the bottom valve thinks the top valve is a non-linear impedance of around 300kΩ.

Transformers should not be considered in the same way as other passive components. When Tim or I design a transformer, it is specially constructed to perform at its best in a particular circuit. The 300B driver transformer is intended to be used as a phase splitter and driver and would not be suitable for driving a single-ended 845; a bi-filar single-ended transformer with something like a 5687 or 6BX7 valve should be used to drive the 845.

The design is original in that it is not a data sheet clone, which unfortunately many commercially available amplifiers, valve and solid state, are. This type of topology has been around for a long time, so has using canvas and oil paints, but that doesn't mean that all oil paintings are re-hashes of older works.

The core of the transformer should be electrically earthed as you say, but it needs to be lifted off of the chassis otherwise large eddy currents are set up in the chassis causing the transformer to heat up. **AG**

On the safety front, I had a discussion with Tim about core isolation and he pointed out that transformer bobbins are heat resistant and flash tested to over 3000V and that there comes a time that you have to trust to the properties of insulators or, for example, ordinary electrical cabling could be considered an unacceptable hazard. In his view, it was unnecessary to put in a special earth, but it can be done by using an earth wire between chassis and core. However, the laminations should not, for magnetic reasons, touch the chassis, as Andy explains. The output transformers can be electrically earthed in the same manner if desired.

Study the original manufacturers descriptions and then note that K5881 is quieter (hiss) than most solid state amplifiers available today and you'll understand why I used the EF86 instead of an ECC83.

Both Tim de Paravicini and Andy Groves are experienced transformer designers and, I'm learning, the driver transformer is the most difficult transformer of all to make work well, even though it is technically the most elegant solution to phase-splitting and driving. Tim insisted his be potted by himself alone, in a specially made can of one-eighth inch thick mild steel, with ball bearings in the potting compound to prevent people hacksawing the thing open. Andy spends hours musing over cross coupling arrangements and ways of lessening and neutralising capacitances to smoothly extend bandwidth whilst retaining high frequency balance (he also spends of fortune on getting prototypes built!). It's a dark art, but a fascinating one. **NK**

Hart Audio Kits - Your Value for Money Route to Ultimate Hi-Fi

2 Penylan Mill, Oswestry, Shropshire, England SY10 9AF
phone Oswestry (0691) 652894

Hart Audio Kits and factory assembled units use the very best audiophile components in circuit designs by the renowned John Linsley Hood to give you unbeatable performance and unbelievable value for money. We have always led the field for easy home construction to professional standards, even in the sixties we were using easily assembled printed circuits when Heathkit in America were still using tagboards!. Many years of experience and innovation, going back to the early Dinsdale and Bailey classics gives us incomparable design expertise in the needs of the home constructor. The current range of Hart kits is designed to give you the important care components of a system as a matching ensemble of audio excellence

1100 Series. LH80W "Audio Design" Mosfet Power Amplifier.

Another masterpiece from the drawing board of John Linsley Hood and another opportunity to give a system mega sound performance for only a few hundred pounds cost. A host of advanced features, in the hands of the skilled designer, give this amplifier a performance that really is only equalled, not exceeded, by the 4 or 5 figure price tagged exotica.

As always with a HART kit you have the pleasure of building selected, state of the art equipment, allied to the knowledge that your money has all been spent on quality components, you save all the costs of building and testing, plus the dealers margin on top of these by doing it yourself!.

To give an ideo of the measures taken to achieve ultimate quality and linearity in this amplifier each of the four output devices is anly called upon to work at one NINETY-SIXTH part of its ultimate power rating.

We are proud to offer this latest John Linsley Hood masterpiece, the flagship of our range, which we believe is truly the ultimate design for the perfectionist, combining as it does the best circuit design, the best engineering and the best components, surely the only recipe for REAL sound fidelity. The HART KIT concept also makes it possible to build an amplifier with the facilities YOU want and we offer no less than three variations with options on the basic theme to suit your needs. One of these versions will, we feel sure, cater for your requirements. Should your requirements change at a later date then upgrades or alteration to a different version are no problem, try doing that to your High St store amplifier!.

The Standard version has a possive input selector circuit with Alps Precision Low-noise volume and balance controls, switchable CD, Tuner and Pre-amp inputs and an optional stereo bargraph output level display. The 'Slave' version has stereo power amplifiers and standard power supply. The 'Monobloc' version again has the standard power supply but since it is only driving one power amplifier higher than normal output power is achieved with total channel separation. The slave and monobloc versions enable very sophisticated bi-amping and active crossover systems to be constructed.

K1100 Complete STANDARD Amplifier Kit, two power amplifier channels and one power supply module, direct input passive signal selector stage, Construction Manual and RLH11 Reprint.
SPECIAL DISCOUNT PRICE FOR COMPLETE KIT IS ONLY **£395.21**
A1100 Factory Assembled **£499.21**

K1100S Complete SLAVE Amplifier Kit, as above but without passive input stage.
SPECIAL DISCOUNT PRICE FOR COMPLETE KIT IS ONLY **£333.62**
A1100SC Factory Assembled **£422.62**

K1100M Complete MONOBLOC Amplifier Kit, consists of all parts for one power amplifier channel and one power supply module and all chassis parts.
SPECIAL DISCOUNT PRICE FOR COMPLETE KIT IS ONLY **£261.20**
A1100M Factory Assembled **£329.20**

All HART kits are designed for easy home construction to the very highest standards, and can be built by anyone of average manual ability. If you are still not convinced how easy it is to build it yourself with a HART kit you can order the Instruction Manual to read for yourself and we will refund the cost when you buy your kit!.

PROBABLY THE LAST VINYL PREAMP YOU EVER BUY.

For those who love the vinyl medium the listening pleasure can only be enhanced by using the very best phono preamplifier available. The Hart range of phono preamps feature a special shunt feedback circuit topology and are designed by John Linsley Hood. This circuit format gives audibly superior sound to the standard series feedback system normally used and gives a performance that will exceed or equal that given by the best of the mega priced offerings. Our range includes units to suit everyone from the occasional user to the serious audiophile. All can be changed to suit moving coil or moving magnet cartridges at the flick of a switch.

K1500 Series. This is an integrated circuit version of the shunt feedback concept, using so little power that it may be run from batteries. An ideal "first kit" project as it is very simple to put together and no mains voltages are involved.
K1500 Complete Kit With Full Instructions (Battery Powered) **£73.76**
A1500 Factory Assembled **£118.76**

K1450 Features a totally discrete component implementation of the Shunt Feedback concept. Audiophile grade components fitting to an advanced double sided printed circuit board make this a product at the leading edge of technology that you will be proud to own. Nevertheless with our step by step instructions it is very easy and satisfying to assemble. Due to the higher current consumption this unit is powered by our mains driven K1565 Audio Power Supply, itself an advanced piece of technology in a matching case. This supplies the superbly smoothed and stabilised supply lines needed by the preamplifier and features a fully potted Hi-grade toroidal transformer along with a special limited shift earth for hum free operation. Suitable for all moving coil and moving magnet transducers this unit is especially recommended for, and will extract the very best from the modern generation of low output high quality transducers.

K1450/1565X. Complete RIAA Phono preamplifier, Power Supply and power connect cable Kit form **£196.29.**

1450/1565X Factory assembled & tested. **£285.29.**

ALPS PRECISION LOW-NOISE STEREO POTS

Now you can throw out those noisy ill-matched carbon pots and replace with the real hi-fi components only used selectively in the very top flight of World class amplifiers. The improvement in track accuracy and matching really is incredible giving better tonal balance between channels and rock solid image stability.

On the motorised versions the 5v DC drive motor is coupled to the normal control shaft with a friction clutch so that the control can be operated manually or electrically.

Our prices represent such super value for pots of this quality due to large purchases for our own kits.

MANUAL POTENTIOMETERS

2-Gang 100K Lin	**£15.67**
2-Gang 10K, 50K or 100K Log	**£16.40**
2-Gang 10K Special Balance, zero crosstalk and zero centre loss	**£17.48**

MOTORISED POTENTIOMETERS

2-Gang 20K Log Volume Control	**£26.20**
2-Gang 10K RD Special Balance, zero crosstalk and less than 10% loss in centre position	**£26.98**

HC80 Replacement Cassette Head.

The excellent performance of modern cassette recorders depends totally on the quality of the R/P head. Even the slightest amount of wear can impair the frequency response and distortion levels. Our HC80 is a top quality head from one of the foremost manufacturers in Japan. It is easily fitted to most standard stereo recorders (except Sony) and will transform the performance over a worn head. Only the fact that we buy these in vast quantities enables us to offer them at the amazing price of **only £11.70** each or **2 for £17.60.**

SPECIAL OFFER

PRECISION Triple Purpose TEST CASSETTE TC1DD.

Are you sure your tape recorder is set up to give its best? Our latest triple purpose test cassette checks the three most important tape parameters without test equipment. Ideal when fitting new heads
A professional quality, digitally mastered test tape at a price anyone can afford.
Test Cassette TC1DD Our price only **£10.99.**

DISK-COUNT Classical CD's.

Top quality, Full Digital (DDD) Compact Disks of the great classical favourites. Like everyone else we didn't like the idea of paying silly prices for CD's. After a long search we have now located a source of top quality classical recordings at prices that make you suspect the quality - until you try them! Send for our list of titles.

TECHNICAL BOOKSHELF

Modern Books Selected to represent the state of the art today.

"THE ART OF LINEAR ELECTRONICS."
J.L.Linsley Hood.
Just Out! Hot Off the Press, the definitive electronics and audio book by the renowned John Linsley Hood. This 300+ page book will give you an unparalleled insight into the workings of all types of valve and solid state audio circuits. Learn how to read circuit diagrams and understand amplifiers and how they are designed to give the best sound. The virtues and vices of passive and active components are examined and there are separate sections covering power supplies and the sources of noise and hum. As one would expect from this writer the history and derivation of audio amplifier circuitry have an entire chapter, as does test and measurement equipment. Copiously illustrated this book is incredible value for the amount of information it contains on the much neglected field of linear, as opposed to digital, electronics. Indeed it must be destined to become the standard reference for all who work, or are interested in, this field.

SPECIAL OFFER. With each book purchased you may request a **FREE** extended index, written by the Author, exclusively from HART.
0-7B06-0868-4. **£16.95**

Don't forget most of our kits have reprints of articles by John Linsley Hood that you can purchase separately.

"THE LOUDSPEAKER DESIGN COOKBOOK" Vance Dickason. (4th Edn.)
All the information you need to build the loudspeaker system you have always wanted but could not afford. Easy ways to pick the exact box size, the ideal drivers, and the correct way to feed the music to your new super loudspeaker system. Over 140 pages packed with important design data.

1991. 152 Pages.
0-9624-191-7-6 **£19.97**

"THE ART OF SOLDERING"
R. Brewster.
Absolutely essential reading for anyone who ever picks up a soldering iron. Written from knowledge gained in a lifetime in the field, this is the first book ever solely devoted to this essential and neglected skill for all electronic enthusiasts. Covers everything from the correct choice of soldering iron and solder to the correct procedures to follow with many illustrations and practical exercises.
0-85935-324-3. **£3.95**

Classics from the "Golden Age"

"THE WILLIAMSON AMPLIFIER."
D.T.N.Williamson.
In April 1947, Williamson's power amplifier, using excellent quality push/pull output valves, a special output transformer, and a highly filtered power supply, became an overnight success. The author takes the reader deep into his design considerations, offering practical advise on how to build the units plus concise instructions on setting up the new amp. A cult classic.

1947, Reprinted 1990. 40 Pages.
0-9624-1918-4 **£4.95**

LOUDSPEAKERS; THE WHY AND HOW OF GOOD REPRODUCTION. G.A.Briggs This easy-to-read classic, last revised in 1949, introduces the reader to concepts such as impedance, phons and decibels, frequency response, reponse curves, volume and watts, resonance and vibration, cabinets and baffles, horns, room acoustics, transients, crossovers, negative feedback, Doppler and phase effects, and much more. A provocative survey of the right questions about sound reproduction.

1949 Reprinted 1990. 88 Pages.
0-9624-1913-3 **£6.95**

Send or phone for your copy of our FREE list of these and many other Kits & Components. Enquires from Overseas customers are equally welcome, but PLEASE send 2 IRCs if you want a list sent surface post, or 5 for Airmail. Ordering is easy. Just write or telephone your requirements to sample the friendly and efficient HART services. Payment by cheque, cash or credit card. A telephoned order with your credit card number will get your order on its way to you THAT DAY.
Please add part cost of carriage and insurance as follows: **INLAND Orders up to £20 - £1.50, Order over £20 - £3.50. Express Courier, next working day £10. OVERSEAS - Please see the ordering information with our lists.**

QUALITY AUDIO KITS | 24hrs. SALES LINE (0691) 652894 | ALL PRICES INCLUDE UK/EC VAT

THE HI-FI LAW OF DIMINISHING RETURNS

Ask a Hi-Fi dealer to upgrade your system, and he'll sell you ever more expensive bits of hardware, giving you a constantly changing sound, new solutions producing more problems which can only be solved with more expensive equipment. The harder you try, the more it costs and the less satisfying the results. This is the well known Hi-Fi law of diminishing returns. We have an alternative:

THE RATA LAW OF INCREASING RETURNS

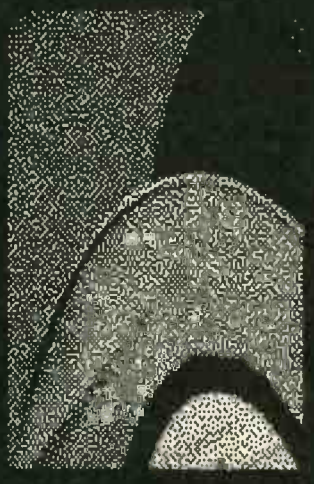
Why buy new equipment when it makes more sense to realise the full potential of your existing equipment. Don't replace it, upgrade it; it's cheaper. Most equipment can be transformed by us for the cost of a dozen CDs. Magic? No - logic! To find out how we do it, ask for our new free Catalogue; it provides discussion, analysis and a definitive resource of audiophile components and advice on the art of recreating music in the home.

Russ Andrews
Audiophile Catalogue

Includes :-

- CD Players, Preamplifiers, Disc Preamplifiers, Power Amplifiers,
- Loudspeakers
- Kimber Kable
- Upgrading Services and Guides
- Audiophile Kits and Components
- Accessories
- Reviews

1993 Edition 2 Available Now



RATA
Edge Bank House,
Skelsmergh,
Kendal,
Westmorland, LA8 9AS

Tel: 0539 823247
Fax: 0539 823317

UK: Post Free,
Europe: 3 International Reply Coupons.
Overseas: Send US $3 bill or four IRC