

VALVE

VINTAGE AUDIO LISTENERS AND VALVE ENTHUSIASTS

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at Classic Audio

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VALVE

*is the newsletter of
Vintage Audio Listeners and
Valve Enthusiasts
dedicated to the preservation
and dissemination of vintage
audio knowledge.*

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flow from minus to plus, and
they can kill you along the way
if you're not careful.
Vintage audio equipment
operates at potentially lethal
voltages. Always treat it with
respect.*

editor's thing

Well, here's an issue of firsts. First first, a new format. Printing costs were getting so high that the VALVE bank account wasn't going to last through the year. The solution came to me after I finished this edition in the old format, so I stayed up even later than usual to downsize the whole thing. Sorry it's a little late.

Second first, new interest. Very generous promotion from Antique Radio Classified, Seattle used audio retailers, and Glass Audio in particular, has generated a great deal of interest from across the country this month. Consequently an extra large printing of this edition will be sent out to prospective new members and newsletter subscribers.

Which leads to the third first. A new Newsletter Only subscription is now available at a rate of \$20.00 per year. This is for folks outside the Puget Sound area who won't be able to take advantage of our great vintage equipment auditions and swap sessions. Of course if you're in town, you are always welcome to be a guest at one of our regular meetings. (Sorry, but you won't get in to our special 'meetings with collectors', coming in the future, without a full membership)

Fourth first. I heard that Charles Kittleson, author of The Vintage HiFi Spotter's Guides, should be coming up later this month. If things go right, we'll have a special meeting around the 17th to hear what new books Charlie is cooking up, and to pick his brains about collecting a bit.

Fifth first, I guess I'll keep this column. I need something to fill this space every month.

Don't let the blue smoke out,

DAN

letters from fred

great recollections from Fred Suffield, P.E.

26 Aug. 94

Dear Dan,

Have been busy finishing a technical article for the Proceedings of the Radio Club of America. It covers the AN/APS-6 night fighter radar that was in the F6F airplane that Grumman made during WW-II. Took about six years to round up the data, and dig into my old files. Have three others in work. There goes my spare time!

I recall when I worked for Westinghouse at the New York World's Fair in 1938-39-40, several of us designed and built a display with a simplified schematic of a transmitter and receiver, with small lights like you see in signs, showing DC, AC etc. by the flashing.

On the area in front was a simple osc. modulated output, and receiver, all matching the flashing lights. With some good guides tried to explain to the public how a radio worked. Had a microphone that they could shout into and see their voice pattern on a 3" scope and hear themselves.

Most of the time people spent trying to steal the microphone! The chrome on the stand and mike was worn off at the end of six months! New York trade shows and exhibits were a problem, more stuff was lost by pilfering than any other area.

One enterprising transformer company who were building a good HiFi output at the time made one in the hermetically sealed case, same color, with the marking and all just like the ones they sold. Except they put a lot of iron and wax into it so it weighed OK, and wired resistors across the terminals so that with a meter it read OK.

Sure enough someone stole it during the IRE Spring Show.

About three months after that the guy had the nerve to return it to the company and said it did not work and he spent his good money for it! Imagine the time he spent trying to get it working, and the frustration when all measured OK!

At the NY World's Fair there were many sound systems putting out music, every exhibit had one or more. At that time RCA was turning out a batch of 50 and 100 watt amplifiers with Push Pull 6L6 tubes. Not HiFi by today's standards, but good for the purpose. Western Elec. used their own systems. The speakers were generally Jensen, but Cinaudagraph was an up and coming company, they made permanent magnet speakers when others did not want to give up large field coils. They made some 18" and a few 24" ones, the Lagoon of Nations had several of the 24" ones and they put out plenty of sound, over the sound of the many fountains.

I enjoyed working there, as I lived about a half hour away, and liked the late shift. I would get home about midnight, and not have to be there until about noon the next day. Could take my boat out all morning.

Best Regards,



Why not write to us about some of your vintage audio experiences? Give us an historical perspective, discuss some designs, or just tell a story. We'd love to hear from you! Address mail to:

VALVE
1127 N.W. Brite Star Lane,
Poulsbo, WA 98370

surprise appearances by mac and heath

New
**WILLIAMSON
TYPE**

AMPLIFIER Features

- First Williamson Type Amplifier supplied with matching preamplifier.
- Uses Ailtex Lansing Peerless output transformer.
- Practically distortionless — Harmonic and intermodulation distortion both less than 1/2 of 1% at 5 watts output.
- Frequency response 20-1 db from 10 cycles to 100 kc.
- Output impedance 4, 8, or 16 ohms.

The new Heathkit Williamson Type Amplifier kit is the best obtainable in amplifiers today — the choice of the really discerning listener. You can hear the difference and measurements actually bear out the superb performance. Frequency response 20-1 db from 10 cycles to 100 kc allow you to hear the highs and lows with equal crispness and clarity. Harmonic and intermodulation distortion both less than 1/2 of 1% at 5 watts output eliminate the harsh and unpleasant qualities which contribute to listening fatigue.

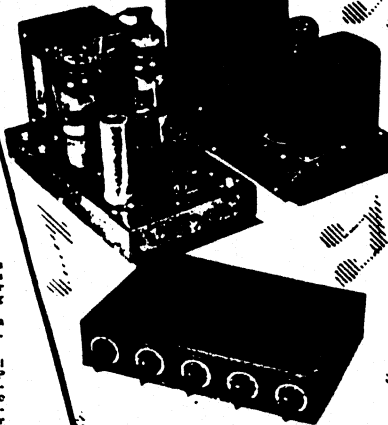
The circuit is similar to the one published in Audio Engineering Magazine for November, 1949, and is considered by engineers throughout the audio field as one of the best ever developed. The Main Amplifier (which may be purchased separately) consists of a voltage amplifier and phase splitter using a 6SN7, a driver stage using a 6BN7, and a push-pull output stage using a pair of 807 tubes. The output transformer is manufactured by the Peerless Division of Ailtex Lansing and is built to their highest standards. Output impedances of 4, 8, and 16 ohms are available. The power supply uses a separate chassis, with husky Chicago Transformer power transformer and choke, and 700V Mallory filters for long hum-free operation. A 5V4G rectifier is used.

The main amplifier and power supply are each on a chassis measuring 7" high by 5 1/2" wide by 11" long.

PREAMPLIFIER AND TONE CONTROL UNIT KIT

The preamplifier kit consists of a 12AX7 (or 12AY7) dual triode first amplifier stage with turn-over control for LP or 78 record types, and a 12AU6 amplifier stage with individual bass and treble tone controls which each provide up to 15db of boost or attenuation. A switch on panel selects either magnetic, crystal, or tuner inputs. Preamplifier also is well suited to custom installations — it will operate in either vertical or horizontal position, and special notched shafts of the controls and switches allow a variety of shaft lengths to be selected. Dimensions: 2 1/4" high by 10 1/4" wide by 7 1/4" deep.

Heathkit AMPLIFIER KIT



WA-A1 Amplifier kit — Combination 1 — (Main Amplifier and Power Supply) complete with WA-P1 Preamplifier kit. Total Ship. Wgt., 34 lbs. (Shipped Express only) **\$69.50**

WA-A1 Amplifier kit only — Combination 4 — (Main Amplifier and Power Supply). Less WA-P1 Preamplifier. Total Ship. Wgt., 26 lbs. (Shipped Express only) **\$49.75**

WA-P1 Preamplifier Kit only. (Less power supply) (Tubes included). Total Ship. Wgt., 7 lbs. (Shipped Express or Parcel Post) **\$19.75**

WRITE
FOR
Free
CATALOG

The
HEATH COMPANY
BENTON HARBOR 25,
MICHIGAN

“ it was a prototype which had been given to a friend of Howard Anthony, founder of Heath’s kit line ”

August's meeting produced the nicest surprises we've yet seen in the old repair shop. Dave had called a day or two before the meeting and pronounced victory over a grotty two chassis Heathkit WA-A1 amp he'd been wrestling with. He offered to bring it in response to my plea for more cool stuff, and I said heck yes.

I had seen the amp at Dave's before he tackled it, and when he showed me, he said he was told it was a prototype which had been given to a friend of Howard Anthony, founder of Heath's kit line.

The WA-A1 was Heath's first Williamson amplifier kit. It used type 807 tubes for output, with 6SN7 input/split load phase inverter and driver tubes.. The power supply was on a separate chassis, using a Chicago power transformer and choke, 5V4 rectifier, and Mallory filter capacitor. The output transformer was an Altec Peerless model. 0.5% distortion figures were stated at 5 Watts output.

The output transformer on Dave's amp gave some credence to the prototype story. It appeared to be a Chicago, potted in a black seamless can. It also had screen taps.

Maybe this really was a prototype for the WA-A2, Heath's improved Williamson amp which used 5881's with a choice of Peerless or Acrosound ultralinear output transformers.

Well, if the story is true, I don't feel too bad about the build quality of my prototypes. This thing was rough. Stuff was hanging off the top, parts were bunched around under the chassis, and there was some suspicious pthchy ooze here and there, under the power xformer and the choke. Of course a lot of this may have happened over the years, a sort of insult to the original constructor.

Regardless of the truth content of the story, I was curious to see how the restoration came out.

thoughtful resto

The restoration was quite a success. Dave had really cleaned the amp up. Along with restoring parts to original spec, he added equalizing resistors across the series connected electrolytics in the first filter stage, and a pair of oil filled caps in parallel for the second stage, after the choke. Coupling caps were mylars. Dave also added a current balance feature, and provision for wiring the amp in either triode or ultralinear mode.

We listened to the amp in both triode and ultralinear mode. As we had a free channel on the preamp and another speaker, we ran our sources in mono and AB'd the Heathkit against a Triophoni amp.

The amp sounded very nice, with the characteristic brightness and detail common to most Williamson amps. The amp maintained the brightness in both triode and ultralinear mode, but seemed less strained in ultralinear mode.

The Triophoni amp had by contrast more bass detail and a softer high end presentation. This tends to verify my feelings that triodes should be used for triode mode and pentodes/tetrodes/beam tubes should be run ultralinear or with a regulated screen supply. One should take advantage of the of the tube's optimal performance configuration rather than make it work as something it isn't.

mc heavy 275

Our second surprise was brought by Steve. He pulled a box out of his enormous Buick and duck walked with it into the shop. Inside the obviously heavy box was a very nice McIntoch MC275.

I was thrilled because I'd never listened to one. Steve asked that we give it a quick check up before playing it since it had sat a while.

A few loose pin sockets were the only problem, and once those were adjusted (see our new tech tips column

this issue) we were ready to play.

Well as expected, a 75 wpc amp sounds much more relaxed and under-worked than a 15 watter in an AB test. But the real difference between the Mac and other amps was its neutrality.

It still sounded like a tube amp, but there was very little of the coloration I had come to expect from any tube amp. No overly forward midrange. No slight high end irritation I usually associate with pentodes, and no softness like I hear with triodes. Bass was fine, maybe slightly shy like tube amps can be, but only slightly if at all.

I can certainly see why people covet these amps. Should be very listenable for hours on end. But they might not have enough tube sound for the hardcore vacuumhead.

p.s.e., p.p.p., m.o.u.s.e.

Which is the perfect cue for my editorial on the new dichotomy in audiophile land.

It appears that enough people have converted to tubes that the old tube vs. solid state arguments can best be preserved for purposes of an historical perspective. Now it's single ended and horns vs. push-pull and non horn speakers.

The opinion going around is that single ended/ horn users really like the single ended amps and convince themselves that horns sound better because they must use them.

The opposing argument is that non horn/ push pull users really like their speakers and convince themselves that push pull amps sound better because they must use them.

The advantage the single ended user has is that they have most likely owned both types of systems. I'd sure like to hear some stories about the pluses and minuses of the change. Can some single ended users take some time to give us some impressions of their conversion to SE/horn systems?

Meanwhile I shall contemplate the

paradox of driving a push pull electrostatic loudspeaker with a DHT/SE transmitting triode amp!

Has anybody seen the ads from a company singing the praises of their new single ended preamp? What a breakthrough. They'll probably come out with an integrated amp with a passive preamp next.

--- dan

Future meetings

Here's a tentative schedule for the next few months

SEPTEMBER 4 - Auditions of McIntosh MC40, Eico HF-89, and Classic Radio Triode Input MkIII. At Classic Radio of Liberty Bay.

TENTATIVE SPECIAL EVENT
SEPTEMBER 17 - a visit with Charlie Kittleson, author of Vintage HIFI Spotter's Guide Vols. 1&2. and producer of Vintage HIFI, the Golden Era. At Classic Audio.

OCTOBER 2 - Meet at Classic Audio to meet owner and VALVE member Jim Lissa.

NOVEMBER 6 - A visit with member Steve Schneider. Auditions of JBL Hartsfields, KLH Nines, McIntosh MI 200's.

DECEMBER 4 - Annual Christmas Party Location to be announced.

JANUARY 8 - A visit with member Rick Graves. Rick is one of the more active collectors in the area.

Dates and events are not firm!

~~corrections~~ corrections

Dave pointed out a mistake in the Triophoni schematic

The plate supply line to the 6CG7 phase inverter (connected to the two 22k resistors going to the plate and cathode) should be coming from the +300 vdc regulated supply, not the unregulated +425 vdc supplying the output tubes.

The Dyna MkIII mod schematic should have had 100k grid resistors (connected between the bias supply on one end and tied to the .22 mfd coupling caps and 1k resistors on the other end) for the 6550's, and the 220k resistors ahead of the 12AU7 grids.

Tube manuals usually spec a 50k grid resistor for 6550's, but everyone seems to use 100k. Anybody know why?

See the description of my 'ultimate MkIII' built for our reference demo amp elsewhere in this issue.

I'm told Mr. LeFevre's name isn't Jim. It's Mike.

the library -

New items this month:

McIntosh MI 200A & B owner's manual

The Acoustical Foundations of Music

Dynaco PAT-5 Manual

Dynaco ST-150 Manual

Sam's Tube Substitution Guide
#19

Thanks once again for your contributions!

Remember, members get copies of any of this material for just a nickel a page.

***Does anybody have early
AUDIO or AUDIO ENGINEER-
ING issues?***

***I'd really like to get a set for our
library.***

what's brewin' ?

Dave's working on putting together a nice mono system.

He'll be using his Heathkit WA-A1 amp, a Fisher 50C preamp he rebuilt, a nice mono Scott tuner, a Thorens TD124 with a 16" SME tonearm, and possibly an Altac 415 Biflex speaker.

Greg is working through some hum reduction on his octal tube preamp. He welcomes thoughts on using a 12SL7 in the phono preamp stage.

Eric now has all the parts to restore some of his amps, most notably an Eico HF-89. We'll audition it when complete.

I went through a Dyna Stereo 150 solid state amp with some mods for more tubelike sound. Very nice, but I'm staying with my new MKIII's

What are you brewing? Drop us a note, or better yet, write an article. We'll help write it if you like. Call Dan at Classic Radio, 206-697-1936 for info.

dinkin' around

tech tips and other unsolicited advice

sloppy sockets

Many older power amps suffer from multiple pluggings and unpluggings of tubes from their sockets. A few months ago Rick brought a Harmon Kardon Citation II to the shop for me to audition. One channel was scratchy and intermittent. Closer inspection revealed that one of the 12BY7 filaments was glowing and fading, off and on.

I called Rick to discuss options, knowing that he likes his equipment in top shape. He said go ahead and replace all the sockets.

I realized that these sockets were a rather unique color, and that replacement would devalue the amp. So I pulled my tiny trusty glasses screwdriver from my tool rack and pushed it in between the metal pin sleeve and the bakelite on each pin hole, being careful not to pry and chip the plastic. All sockets were worked over this way, and the tubes stuck in the sockets like new. The amp fired up perfectly and another treasure was saved.

This is a good way to avoid power tube runaway from a bad grid pin (pin 5 on 6L6 family tubes) contact.

books for collectors

Knowing what your looking at is half the game of collecting old audio gear.

Here's a few publications that are in any serious collector's library:

Vintage HI-FI Spotter's Guide, vol. 1 & 2
Charlie Kittleson's marvelous compilation of old ads from vintage publications. These are the books to have even if you get nothing else. Check out his new video too.
Very nicely done.

Allied Radio Catalogs -

look for fifties and early sixties editions. Packed with info on most major manufacturers components.

These are getting kind of pricey. I've seen them go from a reasonable \$5 to a ridiculous \$20 over the last three years.

Lafayette Catalogs -

ditto above.

Tube manuals - Everyone recommends *RCA RC-30*, which was one of the last manuals printed. It has good circuits in the back and good descriptions of the tubes RCA made, but I find other useful information in *GE's "Essential Characteristics"* manual from 1969.

It covers more obscure tubes and has a good section on military number tubes and European tube substitutions.

Sylvania Technical Manuals are good too.

\$5 to \$10 should get you one of these.

Under the heading of 'hard to find but interesting' I would list the following:

HIFI by Martin Mayer and John M. Conly, 1956

A real gem, giving not only pictures, but recommended systems listings and prices.

By 1959 the same publisher, MACO Magazine Corp. put out *HI-FI Stereo Handbook*, by Edward A. Campbell. It's not as good but still interesting.

RCA put out the *RCA GUIDE for Transmitting Tubes*. This is good for info on those big weird triodes like 845, 211, 8005, etc.

An old RCA tube manual (pre 1940) is good for info on 45's, 2A3's, 6B4's, etc.

Walter Ashe catalogs from the early 50's have McIntosh, Radio Craftsman,

and other early Hi-Fi equipment pictured.

Audio Cyclopædia is not really a picture book of old equipment, but it gives so many examples of equipment and circuits that it's great to have. Exceedingly educational if you really want to know how audio gear works.

Radio's Master, the jobber's reference guide, is a great source for transformer and other parts information. Old editions have speakers, mics and other neat stuff that was the HIFI of the era.

Audio Engineering/ Audio, Radio & TV News/ Electronics World both have great ads and reviews for old equipment as well as marvelous construction articles. If you have the room, they are great to have.

Various sales brochures -
Save 'em all!

Particularly useful are loudspeaker brochures, for their specs, but brochures for any equipment are worth keeping. They tend to be far more scarce than the equipment itself. As a matter of fact, a smart person would be saving brochures on current equipment for his kids to sell for a fortune 50 or 60 years from now!

Finding a lot of this stuff is not easy. My advice is don't get too keyed up about getting it all by the end of the month. Kick back, keep your eyes open at the swaps and garage sales, and don't forget about photocopies of friend's stuff.

In a future issue I'll discuss books and magazines for the constructor.

-- dan

thanks, Glass Audio

The latest issue of Glass Audio carries our new listing in the Clubs section of their classified ads.

They also gave us a very nice write up in Glass Case, their new product page.

Response has been great, with inquiries from as far as New York, Ontario, and San Francisco.

Due to this long distance interest we will offer a newsletter only subscription rate of \$20 per year.

While reading about vintage audio is not quite the same as getting to audition a rare piece every month, nationwide dissemination of vintage audio info can only help everyone involved.

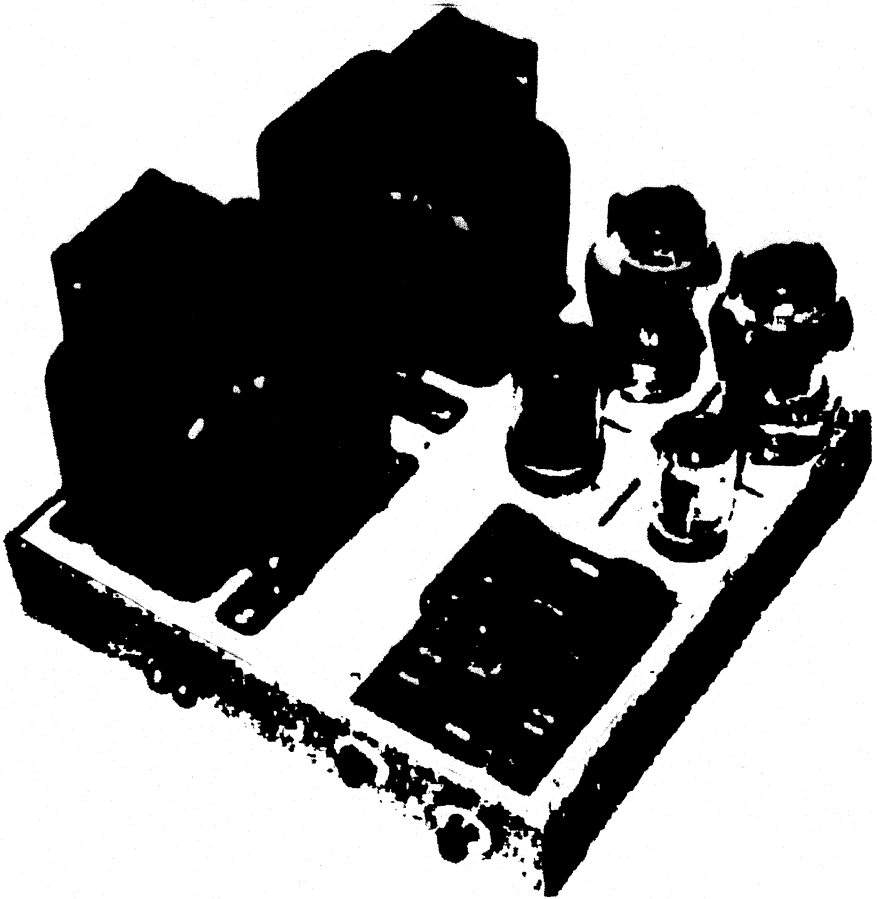
Pacific Northwest Audio Society (PAS)

I spoke with Ed Yang of PAS this week. A very pleasant fellow. You may recall my mention of contacting PAS a few months ago. Well, I didn't get too far with the previous contact, but Ed gave me an enthusiastic welcome to visit a PAS meeting, and I extended the same invitation to him.

I'm looking for VALVE members who might like to accompany me to one of their meetings. They meet the second Wednesday of the month, 7:30 - 9:30 on Mercer Island, at 4545 Island Crest Way.

Call Ed Yang, 206-232-6466, for more information about PAS.

my own triode input MkIII
*dan remakes a Dyna MkIII to "juice his lizard"**
**with apologies to Corey Greenberg*



A remarkably bad graphic representation of a very pretty amp. Squint to see the Tung-Sol 6550's, new tube arrangement, Vitamin Q caps, new bias pot location, and cool paint job.

Some of you may remember that I was so enamored of the MkIII's I modified for Chris that I wangled a pair for myself.

As I recall I bought a Fisher 20A, swapped that and some other stuff for a MkIV, and then swapped the MkIV and a pair of Ampex monoblocks for the MkIII's. Then I swapped a Philco Model 60 cathedral radio for a quad of Tung Sol 6550's.

Then I made my list of parts for the mod. I ordered polypropylene caps and metal film and power resistors from Mouser, and axial electrolytics from Antique Electronic Supply. Mean time Eric scored some 1.0 mfd @ 400V Vitamin Q caps for me on their way to a dumpster.

I stripped the chassis, repainted everything in Classic Radio colors and enlarged the filter cap mounting hole into a proper octal socket cut out. Output tube sockets went to the outer edge of the chassis, where the rectifier and filter had been, and the rectifier and a new 6SN7GTB driver were installed where the output tubes had been.

The circuitry was rewired like the original mod. Write us if you'd like a copy of the original article (grid resistors were reversed in the schematic. See Corrections, p.3).

I added a balance pot, based on the Boak mod in TAA. This pot was installed where the bias pot had been, and the bias pot was installed through a plate mounted in the preamp power socket hole on the front panel.

Filters were crammed under the chassis as follows:

first stage - 50 mfd @ 900 VDC (two 100mfd @ 450v in series with 100k ohm equalizing resistors)

second stage - 100 mfd @ 600 VDC (two 200 mfd @ 300v in series with 100k ohm equalizing resistors)

each following stage - 100 mfd @ 450V. Bias caps were increased to 100 mfd @ 160V low ESR.

The power cord was replaced with a grounded shielded model, and MOV's were placed across the mains and from each leg to ground. The selenium bias rectifier was replaced with a silicon fast recovery diode.

Once again I used my cool 'star ground bus'. I take a long terminal strip tied to the chassis and solder # 12 wire along all the terminals. All ground leads go to this strip, with input ground at one end and power supply ground at the other. Liberal use of terminal strips under the chassis makes all these mods doable if not perfectly accessible.

The Vitamin Q's sit on the PC board (to show them off, of course) and couple the phase splitter to the 6SN7GTB. The 6SN7 is coupled to the 6550's with 630V polypropylenes, as I haven't collected quite enough Vitamin Q's to do the job.

During the smoke test everything went great. When I connected input from a preamp and I got a little hum. I've been testing for audible hum with Eric's A7's or my Stretchorn. If hum is going to show up, your gonna hear it through a horn loaded woofer!

It turned out that the original schematic spec'd a 10 ohm resistor from the input minus to ground. When I smoke tested with a grounding plug in the input, this resistor was shunted, so I got no hum. Replacement of the resistor with wire solved the problem and I got another nice quiet amp.

In the original mod, I found that coupling the screen to the plate (for triode input, get it?) in the pentode section of the 6AN8 with a 100 ohm resistor was not as smooth sounding as coupling it with a .22 mfd capacitor. On this amp the resistor worked great, resulting in a bit more detail without highs getting too edgy. Fabulous midrange presence, great detail.

It juices my lizard.

dan

classifieds

Ads are free to members.

Non member ads cost .25 per word.

Call Dan at Classic Radio of Liberty Bay, 206-697-1936 to list your ad.

Deadline is the 25th of the month.

For Sale - Pair Heathkit W4-B amps, in excellent condition, \$250. Harmon Kardon Citation I Preamp, works well, \$50. Myron, 206-782-0926.

Wanted - Audio - the older the better - acoustic records, wind up phonographs. I specialize in acoustic phonograph repair. John, 206-373-7315.

For Sale - Pair KLH Model 12 loudspeakers, \$150.

Pair Scott HiFi speakers Model S10? 12x23 1/2x9 walnut cabinets \$50.

Scott 222C int. amp, recommended in Vintage HiFi Spotter's guide, \$100.

Scott 350 tuner, \$100.

Bogen AP30 stereo int. amp., PP 6V6's \$25.

Grommes 10LJ stereo int. amp., SINGLE ENDED 6BQ5's! \$20.

Grommes 24PG stereo int. amp., PP 6BQ5, \$20.

Rauland rack mount power amp SA51A-25/70, 6CA7 output, \$60, no output tubes.

Pair Dynaco MkIV's, excellent, all fresh caps, \$350.

Want Fisher components, particularly 50AZ, 125AX.SA-1000. Crazy Eric, 206-871-5921.

Wanted - Factory Manual or copy of Eico MX-99 Multiplex adapter. Need info on later version not covered in Sam's. Greg, 206-683-1744.

For Sale - 2 60W mono P.A. amps using 6L6's, \$200 / o.b.o. Steve, 206-325-0864.

For Sale - Miracord 4 spd. changer in original box, like new. Excellent for Vintage 78's. Bill, 206-859-3592.

For Sale - University RRL-12 Loudspeakers, \$60. Sansui 8080 Receiver, \$100. Stan, 206-697-6936.

For Sale - Thorens TD124 turntable. Gary 206-523-4838.

For Sale - Triophoni, the custom built triode output monoblocks described in the August issue. These amps feature true triode output, a Mullard style input circuit, gaseous regulation of input and driver stages, polypropylene coupling caps, and adjustable bias and balance. And they're beautiful too.

\$900 the pair with a one year warantee. They can be auditioned at Classic Audio, 7313 Greenwood, Seattle, or call Dan at Classic Radio of Liberty Bay, 206-697-1936, for more info.

For sale - Harmon Kardon Madrigal II Am/FM/Stereo tube tuner. Works fine, cosmetically average. \$45.

Dynaco ST-150, modified for approx.

140 wpc output similar to Pat Amer TAA mod. Direct coupled input, Vitamin Q caps in feedback loop. \$200.

Dyna Pat 5, stock. \$100.

Ampex AM/FM tube tuner and rare multiplex adapter using 4 12AX7 tubes, works great, no cabinet, \$50.

Dan, 206-697-1936.

VALVE assumes no responsibility for the integrity of those advertising in these classifieds. Caveat emptor.

Cinaudagraph Speakers, inc.

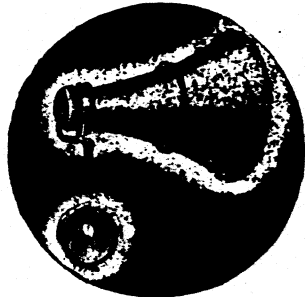
PUBLIC ADDRESS SPEAKERS AND AIR COLUMN UNITS

The ultimate in precision built, high quality reproducers for the largest or smallest installation.



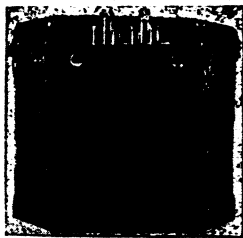
There is a Cinaudagraph speaker for every P.A. requirement from inter-communicating systems to stadium sound projection. All Electro-dynamics have bucking coils.

The speakers listed, with the exception of the 15" and 18", are provided with transformer mounting brackets so that transformers can be easily attached. The speakers, however, are supplied without transformers attached.



Cinaudagraph Air Column Sound Projectors differ from the conventional exponential horn unit. The high efficiency and broad frequency response of these cone type speakers overcome the various deficiencies and failures of the conventional dynamic units.

The air column speakers are made to withstand rigorous conditions imposed by weather and rough handling out-of-doors. The composition of the tough and pliant weather proof cone eliminates failures due to the crystallization of the flexing portions of the conventional brittle metal diaphragms.



The wide range transformers are for use where the highest efficiency is required. These transformers are sealed in metal cases fully protected against moisture, but due to their design can not be mounted on the speaker.

PERMANENT MAGNET

Cat. No.	Model No.	Size	Norm. Watts	Peak Watts	Factor of Merit	Voice Coil Dia.	Ship. Wt. Lbs.	List Price
PM 8-9	EZ 8-7	8"	6	13	173	1"	5	\$ 8.25
PM 8-11	EZ 8-10	8"	8	15	216	1"	5 1/2	10.50
PM 10-12	NZ 10-10	10"	9	16	216	1"	7	12.50
PM 12-13	FZ 12-10	12"	10	18	216	1"	7 1/2	14.00
PM 12-16	FB 12-11	12"	13	21	334	1 1/4"	10	22.50
*PM 12-18	FY 12-12	12"	15	23	430	1 1/2"	12	.....
*PM 13-21	DX 13-12	13"	21	29	556	2"	25	.....
*PM 15-18	FY 15-12	15"	15	23	430	1 1/2"	20	.....
*PM 15-28	FW 15-13	15"	25	33	754	2 1/2"	45	.....
*PM 18-33	DU 18-12	18"	28	43	920	3 1/2"	64	.....
MZ 6-10	Mallard						3 1/4	14.50
*MZ 8-10	Mallard						3 3/4	.....

ELECTRO-DYNAMIC

Cat. No.	Model No.	Size	Norm. Watts	Peak Watts	Field Ohms	Field Volts	Voice Coil Dia.	Ship. Wt. Lbs.	List Price
PE 8-10A	EZE	8"	8	14	1000	90V. DC	1"	6	\$ 7.75
PE 8-10B	EZE	8"	8	14	2500	110V. DC	1"	6	7.75
PE 10-12A	NZE	10"	10	16	1000	100V. DC	1"	7	10.00
PE 10-12B	NZE	10"	10	16	2500	150V. DC	1"	7	10.00
PE 12-16A	FBE	12"	13	21	1000	110V. DC	1 1/4"	12	15.00
PE 12-16B	FBE	12"	13	21	2500	175V. DC	1 1/4"	12	15.00
PE 12-20A	FYE	12"	15	25	1000	110V. DC	1 1/2"	16	22.50
PE 12-20B	FYE	12"	15	25	2500	175V. DC	1 1/2"	16	22.50
*PE 15-35	FWE	15"	30	40	350	110V. DC	2 1/2"	50	.....
*PE 18-40	DUE	18"	35	46	300	110V. DC	3 1/2"	75	.....

Air Column Units and Accessories

For high power installations where maximum coverage is desired, Cinaudagraph Air Column Units are highly recommended.

COMPLETE ASSEMBLY—INCLUDES DRIVER UNIT, EXPONENTIAL HORN, HANDLE OR SUPPORTING BRACKET—(No Stand)

Cat. No.	Model No.	Peak Watts	Unit No.	Horn No.	Handle or Bracket No.	Ship. Wt. Lbs.	List Price
*CM 25K	FBAK	30	CM 25A	KA	U	33	.....
*CM 30K	FYAK	35	CM 30	KA	U	35	.....
*CM 40WH	HWAW	45	CM 40	SW	HA	52	.....
*CM 60WS	SUAW	65	CM 60	SW	SA	63	.....

Driver Units

Cat. No.	Model No.	Factor of Merit	Voice Coil Dia.	Norm. Watts	Peak Watts	Ship. Wt. Lbs.	List Price
*CM 25A	FBA	334	1 1/4"	20	30	8	.....
*CM 30	FYA	430	1 1/2"	25	35	10	.....
*CM 40	HWA	754	2 1/2"	35	46	30	.....
*CM 60	SUA	920	3 1/2"	55	65	40	.....

All of the above are supplied with 6-8 ohm voice coils.

Exponential Horns

Cat. No.	Bell Dia.	Over-all Length	Cut-off	Ship. Wt. Lbs.	List Price
*KA	24"	39" (including back cover)	150 cps.	25	.....
*SW	32"	30" (from driver to bell opening)	150 cps.	23	.....

Accessories

B-FS	Telescopic floor stand with heavy cast base—maximum height 8 ft., black crackle finish	33	\$17.50
T1	Line transformer fully encased; 1500 ohms tapped 1000-500 ohms. 40 watts, max.	6	12.00
T2	Line transformer fully encased; 1500 ohms tapped 1000-500 ohms. 60 watts, max.	10	15.00
U	Supporting stand for KA horn	4	4.50
SA	Handle and supporting bracket for CM 60WS	3	5.75
HA	Handle and supporting bracket for CM 40WH	3	4.50

WIDE RANGE TRANSFORMERS

Wide range transformers designed for use with these speakers assure maximum efficiency.

UNIVERSAL OUTPUT				UNIVERSAL LINE			
Cat. No.	Undistorted Peak Watts	List Price	For Speaker	Cat. No.	Undistorted Peak Watts	List Price	
WR 1	Up to 8	\$4.00	10" - 12"	WR 5	Up to 8	\$4.00	
WR 2	Up to 12	5.25	12" - 13"	WR 6	Up to 12	5.25	
WR 3	Up to 18	6.50	13" - 15"	WR 7	Up to 18	6.50	
WR 4	Up to 40	8.50	15" - 18"	WR 8	Up to 40	8.50	

*DISCONTINUED FOR DURATION

CROSS REFERENCE

V. T. VS. R. M. A. RADIO TUBE TYPE NUMBERS COMPILED BY COMMERCIAL
ENGINEERING DEPT. NATIONAL UNION RADIO CORP., NEWARK, N. J.

DESIGNATIONS

VT	RMA	VT	RMA	VT	RMA	VT	RMA
1	WE203A	78	78	134	12A6	203	9003
2	WE205B	80	80	135	12J5GT	204	3C24
4B	211	83	83	135A	12J5	205	6ST7
4C	211SPEC	84	84/6Z4	136	1625	206A	5V4G
5	WE215A	86	6K7	137	1626	207	12AH7GT
6	212A	86A	6K7G	138	1629	208	7B8
7	WX12	86B	6K7GT	139	OD3/VR150	209	12SG7
8	UV204	87	6L7	141	WL531	210	1S4
17	860	87A	6L7G	143	805	211	6SC7
19	861	88	6R7	144	813	212	958
22	204A	88A	6R7G	145	5Z3	213A	6L5G
24	864	88B	6R7GT	146	1N5GT	214	12H6
25	10	89	89	147	1A7GT	215	6E5
25A	10Y-10SPEC	90	6H6	148	1D8GT	216	816
26		90A	6H6GT/G	149	3ABGT	217	811
27	30	91	6J7	150	6SA7	218	100TH
28	24A	91A	6J7GT	150A	6SA7GT/G	220	250TH
29	27	92	6Q7	151	6A8G	221	3Q5GT
30	61A	92A	6Q7G	151B	6A8GT	222	884
31	31	93	6B8	152	6K6GT/G	223	1H5GT
33	33	93A	6B8G	152A	6K6G	224	2C34-RK34
34	207	94	6J5	153	12CBY(SPEC)	225	307A
35	35/51	94A	6J5G	154	814	226	3EP1/180GP1
36	36	94D	6J5GT/G	161	12SA7	227	7184
37	37	95	2A3	162	12SJ7	228	8012
38	38	96	6N7	163	6C8G	229	6SL7GT
39	869	97	5W4	164	1619	230	350A
39A	869A	98	6U5/6G5	165	1624	231	6SN7GT
40	40	99	6F8G	166	371A	232	EL148
41	851	100	807	167	6K8	233	6SR7
42	872	100A	807SPEC	167A	6K8G	234	114B
42A	872A	101	837	168A	6Y6G	235	615
43	845	103	6SQ7	169	12CB	236	836
44	32	104	12SQ7	170	1ESCP	237	957
45	45	105	6SC7	171	1R5	238	956
46	866	106	803	172	1S5	239	1LE3
46A	866A	107	6V6	173	1T4	240	710A
47	47	107A	6V6GT/G	174	3S4	241	7E5/1201
48	41	107B	6V6G	175	1613	243	7C4/1203A
49	39/44	108	450TH	176	6AB7/1853	244	5U4G
50	50	109	2051	177	1LH4	245	2050
51	841	111	5BP4/180P4	178	1L06	246	918
52	45SPEC	112	6AC7/1852	179	1LN5	247	6AC7
54	34	114	5T4	181	7Z4	248	3CP1/1808P1
55	865	115	6L6	182	3B7/1291	249	1006
56	56	115A	6L6G	183	1R4/1294	250	EF50
57	57	116	6SJ7	184	0B3/VR90	251	WL441 SERIES
58	58	116A	6SJ7GT	185	3D6/1299	252	923
60	850	116B	6SJ7Y(SPEC)	187	575A	254	304TH
62	801/801A	117	6SK7	188	7E6	255	705A
63	46	117A	6SK7GT/G	189	7F7	256	CL486
64	800	118	832	190	7H7	257	K-7
65	6C5	119	2X2/879	191	316A	259	829
65A	6C5G	120	954	192	7A4	260	0A3/VR-75
66	6F6	121	955	193	7C7	264	3Q4
66A	6F6G	124	1A5GT	194	7J7	266	1616
67	30SPEC	125	1C5GT	195	1005	267	WL578
68	6B7	126	6X5	196	6W5G	268	12SC7
69	6D6	126A	6X5G	197A	5Y3GT/G	269	717A
70	6F7	126B	6X5GT/G	198A	6C6G	277	417
72	842	128	1630	199	6SS7	279	GY2
73	843	129	304TL	200	OC3/VR105	282	ZG489
74	52A	130	250TL	201	2SL6	286	832A
75	75	131	12SK7	201C	2SL6GT/G	287	815
76	76	132	12K8	202	9002	288	12SH7
77	77	133	12SR7	180	3LF4	289	12SL7GT

NEXT TIME YOU FIND A BOX OF OLD MIL SPEC TUBES, HAVE
THIS SHEET WITH YOU.
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