

DARLING FEST '99



Our DIY cybergang meets in the flesh

by Jeremy Epstein



*The "Be-There-or-Be-Square"
audio event of the week, for sure!*

One of the facts of modern life is that you can make friends now before you ever meet them. One such friend I've made is rocket boy Bob Danielak, who, when he is not engineering power systems for com satellites, designs and builds (oh, how he builds!) a wide variety of audio equipment. I had made his acquaintance via e-mail when I took a design of his, an RIAA preamp, and hacked it all to hell. We hit it off and kept up a running discussion of long standing.

One of the topics we touched on was Bob's "Darling" amp, during the early stages of its evolution (see SP #15.) He was touting his little SET amp design, using the 8532 seven-pin-mini single triode as its driver, and the 1626 pre-WWII power triode as its final tube, as a great bang-for-the-buck project. I was dubious at the prospect of building a <1 watt circuit as my first triode amp, but the words "cheap" and "fun" kept resounding loudly from his description. I decided to try and build a push-pull version of his design, an intimidating 1.5-watt behemoth, and Bob helped me cut and paste a circuit together using an IT phase splitter.

I built one. It sucked.

I quickly rebuilt it into an IT coupled, single-ended amp using the two 1626 power triodes per channel in parallel, since they were all wired in there anyway. It used a 6SN7 dual triode as driver for both channels, because I like the sound of this tube. In my dusty pile I found a 6BY5 dual damper diode pulled from the back of a discarded TV, so I had tube rectification and everything.

It kinda sucked too, but it was a step forward. I'll spare you some of the gorier experiments along the way, but finally I decided to try ditching the IT altogether and

cap-coupled the driver straight into the parallel 1626's.

This one didn't suck. In fact, I played it for about 200 people at Blackie Pagano and jc morrison's thermionic love-in, nyNoise, and the crowd was very happy with it. Suddenly I was a "made" member of the NY Triode Mafia. The highlight of the day, however, was meeting my faithful consigliere, Bob, face to face. (Face to face to face, actually: he brought his identical twin brother, Rich.) Since then, with Bob's wise counsel, I've developed an even better, DC-coupled version of this amp. All these amps have, true to Bob's word, delivered such good value that I promise you, if you build one, you will be ruined for expensive tweaks forever. The project can probably pay for itself just by doing that.

One eye-opener I discovered in my DC-amp explorations was that the conventional power supply arrangement for a two-stage amp, with a pi filter between the B+ tap for the final tube and the B+ tap for the driver, does not sound as good as a single B+ tap arrangement.

Moving the driver tube's supply to the final tube's B+ tap was one of the biggest improvements I heard during the development process. The soundstage increased from the size of an East Village apartment bathroom to the size of a hotel ballroom with just this one switch. Doing this also allows you to increase the value of the driver plate load resistor (you drop voltage there instead of in the pi filter) which gives better driver linearity, all else remaining equal.

Bob has confirmed this improvement in his amps. We have speculated about it and our belief is that the reorganization of the lead/lag of the power supply time constants sounds better. The single tap approach creates a 180-degree difference in phase between the two stages' PS demands at all frequencies, instead of a frequency-dependent lead/lag. This was the biggest design contribution I was able to make—my approach is more that of a mechanic than a designer, Bob did most of the heavy mental lifting. The only caveat is that the B+ tap you use must be well enough filtered to begin with for use in the driver stage: the conventional arrangement is usually for the purpose of improving the filtering of the B+



for the higher-gain driver stage. Doing this may be good engineering but we found it exacts a sonic price.

Another thing I discovered, at nyNoise, was that getting out of my basement and meeting some of the people who I had known only as e-mail addresses was great fun. I met Larry Moore and "AnnaLogg" there, and the "Darling Fest" project got its start that day.

All the while, back in his garage strewn with tubes and Fiat guts, Bob was performing all manner of vivisections on hapless donor chassis. He was working more with single-1626 final stages, because he hears a more precise and delicate image from these than he does from a 2 x 1626 final stage. (He may be right, too, but I gotta be able to play "Live At Leeds" from time to time, y'know?)

After he published his article, and while we continued posting progress reports to the JoeNet e-mail list about our further experiments, we attracted some fellow travelers. There are at least a couple more people who have built Darling-style amps (there may even be dozens, I get frequent e-mail queries and Bob gets many more.) I have also seen another different circuit on the WWWeb, developed by a Japanese enthusiast, which uses a 1626 final stage. Apparently, the word "cheap" can be translated into Japanese.

Bob doesn't have an electronics problem, he says, "I can quit any time I want." Nevertheless we were able to take seven different amps of his, and add to them my three, plus one made by a fellow named Larry Moore who is quite the amp craftsman. Larry built his with a volume knob, and he goes forth like Johnny Ampseed, patching this nifty little SET amp into the signal chains of everyone he meets.

In numbers, at least, we thought we were getting somewhere. En masse we wormed our way onto the schedule of the New Jersey Audio Society, at the invitation of Valerie Kurlychek, a.k.a. "AnnaLogg."

Bob, his twin brother Rich, and I negotiated the spaghetti-like roads of Brick, NJ and arrived at "Anna's" door early one Sunday afternoon. She gave us a quick demo of the house system, which delivered more output power in one channel than all ten of our amps combined. Nice power, too.

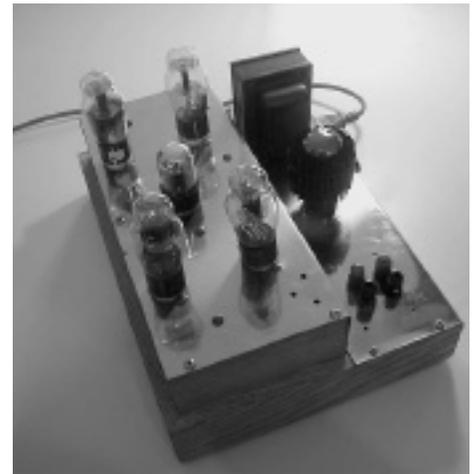
Some folks started straggling in soon thereafter, and we put in a pretty full day: the "Darling Fest" started about 2 p.m. and we were still playing "let's try . . ." and "what if we . . ." after 8:30. We promised her an entertaining day, and I believe we delivered.

The listening panel was uniformly well pleased, and we got comments like "This has been a real eye-opener," and an incredulous, "We're still under 1 watt output here?"

For me, a dozen amp setups are too many to listen to in one day. We played anywhere between two and eight tracks on any one amp, and we played a single benchmark cut on each (a version of "Take Five" by a group led by original Brubeck drummer Joe Morello.) We sure heard far more drums! My preference in auditioning equipment is for month-long trials, (Ongaku donors, take note) covering all sorts of music, and I did try to provide some variety in the cuts I selected for our quick comparisons: Eddie Cochran, Kurt Rodarmer, D.L. Menard, Ray Charles.

The "house" provided some excellent software which contrasted nicely with my selections: "Anna" came up with the Joe Morello and a sweet-sounding disc of recordings made using a Stradivarius violin which were particular hits. The Strad disc made very good use of the Darling family's strong points, and a lot of eyes rolled back in a lot of heads while it was playing.

Ancillary equipment included an excellent pair of Von Schweikert VR4 Generation II speakers, and some very spiffy front end equipment: Musical Design Signature 2 CD player, Balanced Audio Technology VK-5i line amp and Margules Audio phono pre. Phono cables were WireWorld Gold Eclipse II, and the preamp was connected to the phono stage with Harmonic Technologies





Truth-Link. Speaker cables were Vampire as were the CD-player-to-line-amp interconnects. I imagine the pile of interconnects cost more than any two or three of the amps!

All the Darling amps (some to a greater degree than others) were able to create a very convincing sense of instruments in space, and the music almost NEVER seemed to get stuck inside the speakers. Also, as a family trait, the Darlings were unfailingly musical with no listener fatigue or egregiously phony tonal balance that I could detect.

The single Darlings (one 1626 output tube per channel) definitely had volume "issues" in this setup (the 91-dB speakers were being asked to fill maybe a 12'x22' space.) The most noticeable challenges were sustained crescendos: playing them loud pooped the "singles" out dramatically. These amps, as a rule, do not always fare well on audio obstacle courses. They just play music.

Some listeners were very enthusiastic about the original, octagonal Darling. A few people thought this amp had the best sound of the day (when run within its limits.) This amp was also put forth as a terrific candidate for the top of a biamp setup, which it is. Betcha can't build just one!

To me, the best performer of the single-single-ended group, in terms of quality volume output, was a Sakuma-style Darling (1626 driving 1626, with input, interstage, and output transformer coupling). There were

some audible artifacts from all those transients, but the amp overloaded much more gracefully than its classmates. I think experimenting with proper secondary loading for the <\$15 trannies might get a real winner going here!

This was an amp I liked a lot, both in this setup and in a pre-trial at my home. It painted a fine image, but I did sense that there was some "overhang" on transients which I guess may be an artifact of transformer "ringing." It was able to play back music with very pleasing coherence and weight to it, despite this, and I think this can be fixed with some more work.

My two double Darlings (2 x 1626 per channel) fared very well in regard to volume and a sense of weight, but some listeners noticed a decrease in the precision of the imaging with these amps, a little smearing in the treble as it was described to me. (We had several very good listeners and they weren't shy!)

The DC versions of both the single and double Darlings were, to my ears, much better than the cap-coupled versions in all respects. I am lucky to be a neighbor of Don Garber's (he's the manufacturer of the awesome Fi line of SET amps) and his enthusiastic endorsement of DC coupling was what led me to try this in a Darling-style amp. Bob's little "problem" is what led to his experiments, I think. (The DC Double Darling has the Fender "Champ" guitar amp output transformers, but almost all the rest of the amps used Hammond 125E's. Another variable.)

Larry Moore's wrinkle was a convertible Darling amp, which was suited for either a single 1626 or 12V6 (12V version of the 6V6 beam power tube, here triode connected) as the output tube. The 12V6's were slightly more powerful, slightly more "accurate" sounding, but maybe not as lush. Our quick comparison was not enough for me to make up my mind, the difference seemed subtle to me. I want to do some more listening with this amp Larry is pretty clear that he likes the 12V6 setup better.

The bug up Larry's ass is lowering power supply impedance; to that end, his amp, though small, nevertheless has dual, parallel, power transformers. It is a clear winner in terms of good looks: the amp features a gleaming copper top plate and surgically neat wiring below decks.

We auditioned a bold, noble experiment of Bob's, the Darling 3.5 : 3 x 8532 driving 5 x 1626 per channel, using three parallel



1626

TRANSMITTING TRIODE

For oscillator applications requiring unusually stable characteristics

Heater	Coated unipotential cathode	
Voltage	12.6	a-c or d-c volts
Current	0.25	amp.
Amplification Factor	5	
Direct Interelectrode Capacitances:		
Grid to Plate	4.2	μμf
Grid to Cathode	3.2	μμf
Plate to Cathode	3.4	μμf
Maximum Overall Length		4-1/8"
Maximum Seated Height		3-9/16"
Maximum Diameter		1-9/16"
Bulb		ST-12
Base		Small Shell Octal 8-Pin, NICALON*

MAXIMUM CCS RATINGS and TYPICAL OPERATING CONDITIONS

CCS = Continuous Commercial Service

R-F POWER AMPLIFIER & OSCILLATOR - Class C Telegraphy

Key-down conditions per tube without modulation **		
D-C Plate Voltage	250 max.	volts
D-C Grid Voltage	-70	volts
D-C Plate Current	150 max.	ma.
D-C Grid Current	25 max.	ma.
Plate Input	8 max.	watts
Plate Dissipation	6.25 max.	watts
Typical Operation:	5 max.	watts
D-C Plate Voltage	250	volts
D-C Grid Voltage*	-70	volts
	18000	ohms
Peak R-F Grid Voltage	2300	ohms
D-C Plate Current	105	volts
D-C Grid Current**	5	approx. ma.
Driving Power**	0.5	approx. watt
Power Output	4	approx. watts

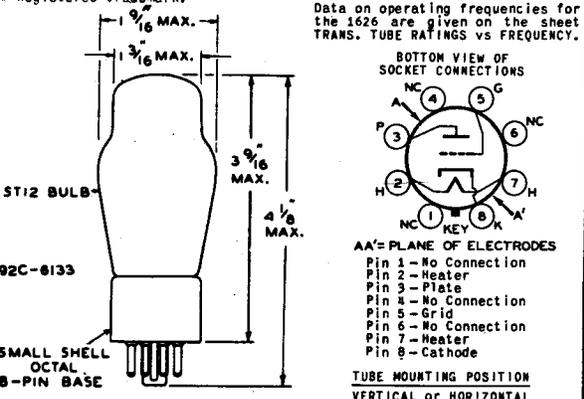
* In circuits where the cathode is not directly connected to the heater, the potential difference between heater and cathode should be kept as low as possible.

** Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

* Obtained from fixed supply (-70), by grid resistor (18000), or cathode resistor (230), or by combination methods. When the 1626 is used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current at a low value. With plate volts of 250, a fixed bias of at least -35 volts must be used.

Subject to wide variations as explained on sheet TRANS. TUBE RATINGS.

Registered trademark.



MARCH 15, 1941

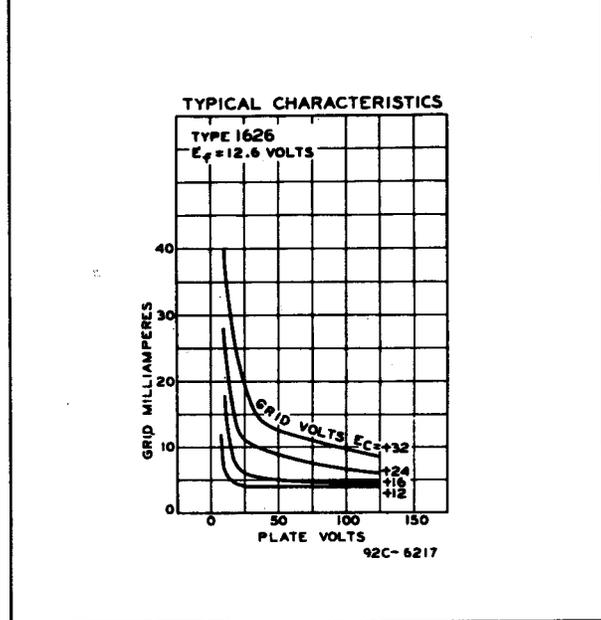
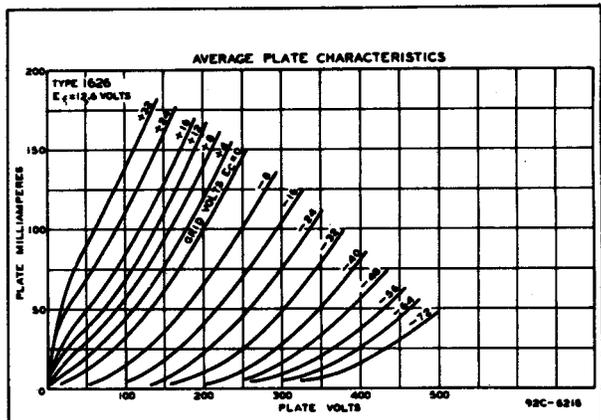
RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

TENTATIVE DATA



1626

TRANSMITTING TRIODE



MARCH 15, 1941

RCA RADIOTRON DIVISION
RCA MANUFACTURING COMPANY, INC.

92C-6216,
92C-6217

power trannies, developing 3.5 watts output. This amp was clearly the most powerful Darling, but there was definitely a diminishing-returns limit being reached: the amp had little of the delicacy and precision of the smaller amps, in fact it sounded a bit rough. This was despite the apparent top-end extension provided by a pair of class One Electron UBT-1 output transformers.

I'd have liked to hear these trannies in another amp, but we had so many amps to audition, that we couldn't do all the clip-lead testing we wanted to do. There is material here for at least another day's listening, what with power supply variations and iron tasting and whatnot.. I wondered if this 3.5

model was perhaps fighting ultrasonic parasitic oscillations with its massively-parallel processing, and Bob wondered the same thing. Anyway, this design needs some more work before I would give it the go-ahead as a recommended project. At 3.5 Watts I would give the nod to a 2A3-based amp, which would be much simpler to build. The 3.5 was easily the most "psycho" DIY unit: 16 tubes is a lot to pile on top of a chassis, even one painted in a demented purple-with-white-polka-dots-and-black-blood-dripping-down color scheme. (MADD: Mothers Against Drunk DIY.)

The last Darling was actually housed in the chassis of Bob's first experimental model. It's now parafeeding some cool, octagonal

UTC line matching transformers and uses a 12SL7 SRPP driver. The para-darling was popular but I myself had some reservations to me, this amp brought the music back into the speaker box much more than the others had done, but its image had less depth to my ears. However Anna thought the soundstage it threw up was particularly wide. It seemed to be about the equal of the Sakuma-darling in its ability to play loud.

For dessert, I set up the DC-coupled 2A3 amp I recently finished, and it worked well to show what the Darlings did and didn't do well. My DC 2A3 is truly a child of the Internet: I got a nifty hum-reduction circuit from another e-mail pen-pal, Steve Bench, and used info about a "tuned choke" LC

trap for the power supply which I gleaned from the rec.audio.tubes USENET newsgroup. I ordered parts from Angela Instruments' and Fair Radio's web sites, and e-pal Bob schmeered me with the Chinese 2A3's and the ceramic sockets for my Johnson - don't try that at high voltages!)

The 2A3 was clearly "big brother." I used AudioNote T-144 output transformers, which allowed for a bit more top and bottom extension as compared to the cheaper Hammonds and Champs. The 2A3 put out somewhat more power, but some of the darlings had imaged every bit as well as this sweet DHT, with sound just as liquid and as sweet. "Anna" had a sublime bit of software which sounded spectacular through this setup (it would have sounded transcendent through an AM radio, too): a 45-RPM test pressing of the Dallas Symphony playing Rachmaninoff's "Symphonic Dances For Orchestra," recorded in 1967, clearly using no compression and a simple signal chain. Wow!

I had been 5th row center at Avery Fisher

Hall the night before and I think her system sounded better than a real event in some ways. Much better imaging—the recording is fairly dry which made for beautifully precise placement of instruments. The tonal balance was as close to perfect as I can recall hearing over a playback system.

Dynamically, well, at one point I just muttered, "Dang!" as the full orchestra hit a powerful accent, which sounded very crisp indeed.

(An aside : a personal highlight of that visit to Avery Fisher Hall was when I pointed to the photo of Mr. Fisher that graces the lobby, and asked my wife if she knew what he had done to amass the fortune that had made his philanthropy possible. The look on her face when I told her that he built tube amps was priceless.)

At the very end of the night, the diehards who were still left tried biamping the speakers. Our first attempt, with a Darling on top and a couple-hundred-watt BEL SS power amp on the bottom, didn't quite work. We

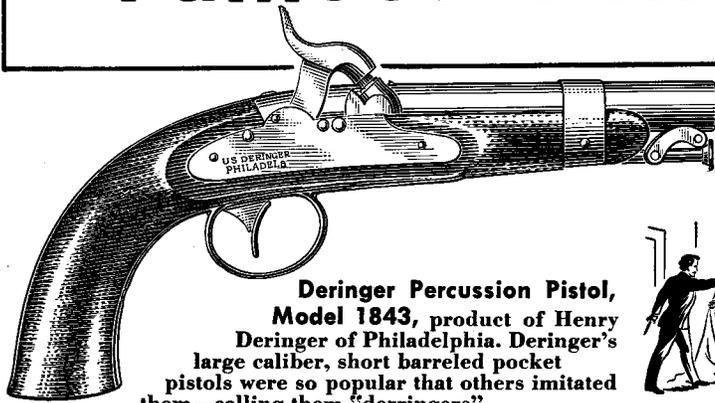
had no means of balancing the two and of course the Darling played way too loud for the BEL to keep up. (Yeah, right.)

We tried the Darling on top and the 2A3 on the bottom: this did balance better. But by the time we got to it, I was no longer capable of listening critically enough to say whether it was a step forward or not.

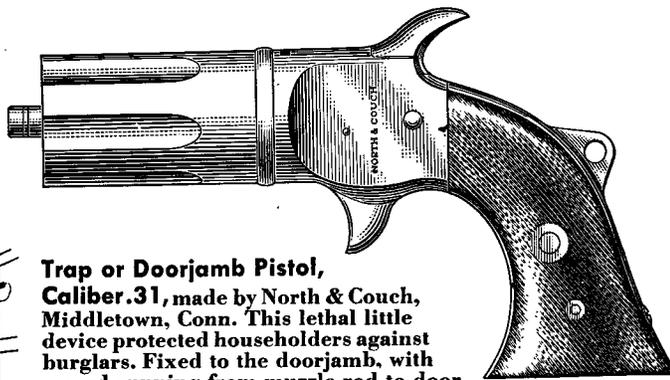
At that point we reluctantly decided to pack up and say our goodbyes. Our hostess with the mostest was misty-eyed to see us go without at least leaving her some gear to remember us by. As an event, it was a big success: one guy who had driven four hours to get there never lost the big grin on his face all day. There were some great hammer-and-tongs tech discussions, with plenty of new ideas to keep all of us busy for many months to come.

I find it very gratifying to get out of my workshop and off of my computer, and to meet some of my colleagues in the flesh : we have a lot of fun together, and it makes me feel like a little less of a geek. Or at least a geek among geeks!

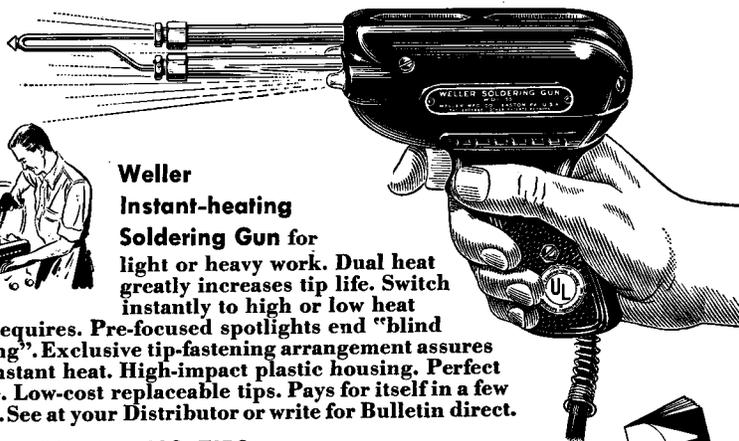
Famous Guns



Deringer Percussion Pistol, Model 1843, product of Henry Deringer of Philadelphia. Deringer's large caliber, short barreled pocket pistols were so popular that others imitated them—calling them "derringers".
John Wilkes Booth used a Deringer to assassinate Lincoln.



Trap or Doorjamb Pistol, Caliber .31, made by North & Couch, Middletown, Conn. This lethal little device protected householders against burglars. Fixed to the doorjamb, with a cord running from muzzle rod to door, the pistol fired all its barrels into any intruder.



Weller Instant-heating Soldering Gun for light or heavy work. Dual heat greatly increases tip life. Switch instantly to high or low heat as job requires. Pre-focused spotlights end "blind soldering". Exclusive tip-fastening arrangement assures full, constant heat. High-impact plastic housing. Perfect balance. Low-cost replaceable tips. Pays for itself in a few months. See at your Distributor or write for Bulletin direct.

Get **SOLDERING TIPS**, new Weller Handy Guide to faster, easier soldering. 20 pages fully illustrated. Price 10c at your Distributor or order direct.

Weller BETTER FROM GRIP TO TIP!

Here is a summary of the listening lineup, with some circuit details :

1) The original Darling (octagonal chassis, as seen in Sound Practices #15) : 8532 driver, 1626 final, Hammond 125E output transformers.

2) The red (evil twin of the green) Darling : same circuit but slightly different power supply.

3) The Double Darling : 6SN7 driver, 2 x 1626 final, 125E OPT's. 6BY5rectifier.

4) The convertible, copper-top Darling, set up as 8532 driving 1626, 125E OPT's. Dual power transformers in parallel.

5) The convertible, set up as 8532 driving 12V6.

6) The DC Darling (or "Monica" - it also goes around naked) 8532 DC coupled to 1626, 125E OPT's. The direct-coupled driver affords slightly more gain than the cap-coupled original Darling design.

7) The DC Double Darling (or "Leo" : Fender "Champ" OPT's, Fender

Stratocaster jack hardware) 8532 DC coupled to 2x 1626, "Champ" OPT's. 5AR4/GZ34 rectifier.

8) The "Darling 3.5." 3 x 8532 driver, 5 x 1626 final. Three parallel power transformers, One Electron UBT-1 OPT's

9) Sakuma-Darling, AES "Nickel Wonder" IT in 3:1 step-up configuration -1626 - Allied 10K:10K interstage - 1626. 125E OPT's.

10) Para-Darling, 12SN7 SRPP driver, 1626 final, parallel fed to UTC line-matching trannies. Voltage doubler power supply.

That was it for the Darlings. Then :

11) DC 2A3 : 8532 DC-coupled to 2A3, AudioNote T-144 OPT's. 5AR4 rectifier, Steve Bench's hum-reduction diode circuit, "tuned choke" power supply filter.

12) Biamp, green evil twin top, BEL SS power amp bottom.

13) Biamp, octagonal Darling top, DC 2A3 bottom.

14) Green evil twin (identical to red evil twin.)

Quite a day!!

Thanks to Zelda at Clippy's 92-hour Photo Finishing for her assistance, to all the participants in the JoeNet for the ongoing education, and to Bob Danielak for being both way out in orbit and right down to earth.