1. Summary

Radio & Hobbies Aug 1954 Standard No.1 amp

Main amp chassis:

Parts

Power transformer	National ??	
Choke	National 15/100	
Output transformer	A&R OT 896	15W +/-1dB 30Hz to 15kHz 'High Fidelity'
6AU6 AWA E1	2x	
6BW6 3C6/252 [CV2136, CV4043]	1x bad	
GZ34 (?)		
Ducon e-cap 12 5 , 95, 95, 95, 105 (so could be 1955)		
Wax: 0325, 0334		
Merlin 5W wire-wound		
2R speaker with 1k5 feedback		

Differences to R&H article:
- 5-pin not 6 pin preamp socket
- 300R not 260R common cathode
- .05u not 01 coupling to 6au6
- 125Ω feedback (not 100)
- GZ34 would give a noticeably higher VS1.
- Chassis layout different.

1954 RH Guitar Amp used 6BW6 PP as well, but with 10k PP and 12AX7.

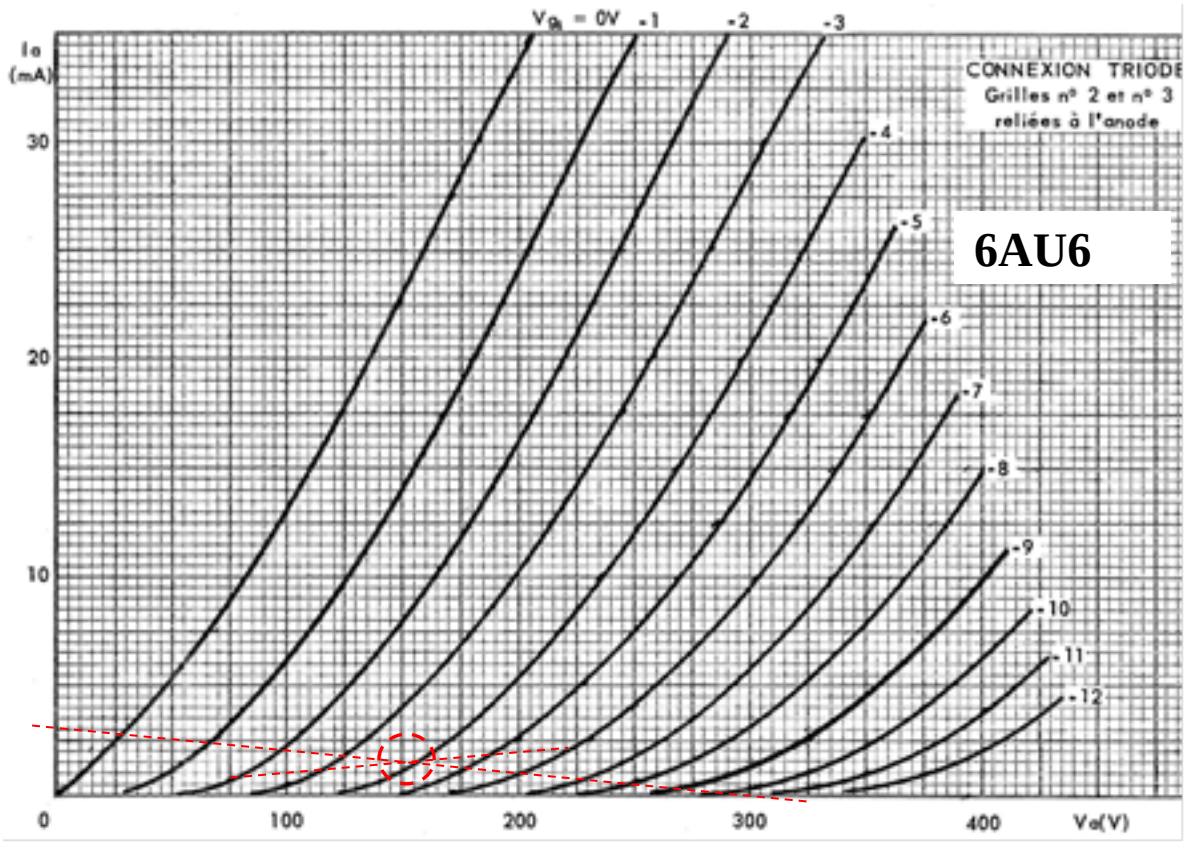
Condition was good with no modifications. Simple commercial alu chassis. Large holes punched, but small holes drilled (and often not dressed). Wirewound 1k and 125R for input cathode. 100mA rated PT and choke, for tuner option. Multiple links to chassis. One 6BW6 milky/gassy with cracked novel glass base due to arcing/charred pin 7 on socket.

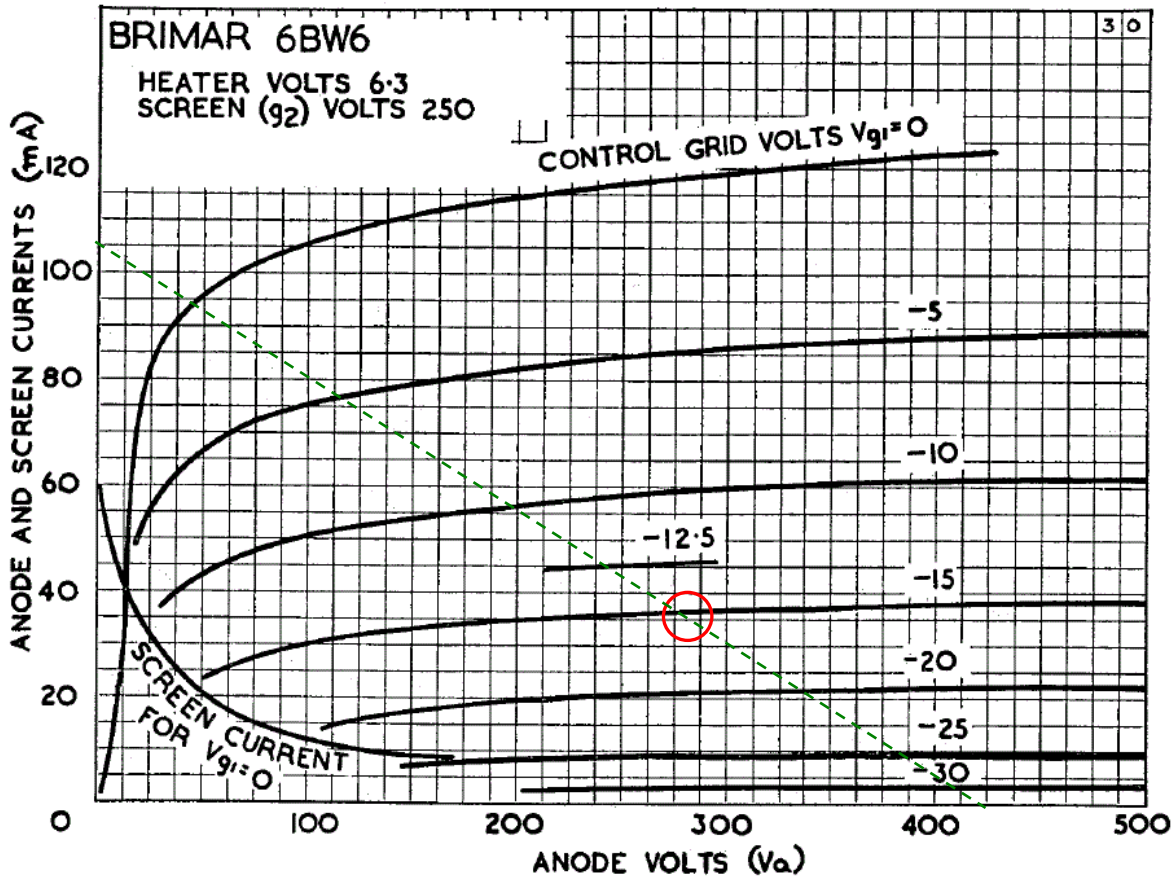
Modifications:
- Mains IEC-fuse-switch-indicator combo with 275Vac MOV on primary.
- 15Ω OPT tap to speaker output to Speakon, with 1.2kΩ // 1nF feedback for 12dB GNFB.
- tuned humdinger and +45Vdc elevation for 6AU6 heaters
- MOV S05K385 across each OT half-primary
- 1N4007 ss diode protection to each rectifier valve anode
- HT secondary CT fuse, 200mA IEC T
- isolated input ¼" socket with shorting contact
- replaced wax and e-caps.
- removed 100pF shunt load on input stage anode, and increased coupling cap to 0.47uF 400V.
- input stopper to output stage.
- 180Ω MF50 screen stoppers to output stage
- cathode 10R current sense for output stage
- Octal socket maintenance monitoring of VS1, VS2, common cathode, and V3-V4 cathode currents.
- 4.0uH series current shunt feedback in speaker neg leg for unconditional stability with 47nF only load.

To do:
- top panel ventilation for under-chassis

- labels

Design:





Output stage with 35mA per cathode, so 18V drop on 260R. PSUD2 with GZ34 and 72mA, 4k5 load, indicates 320V VS1. Voltage drops are .07x260 + .035x104 = 22V, so 300V Vak. Peak hot diode current 1.2A; and peak continuous diode current 0.34A. GZ34 could have substantially more filter cap. 5Y3GT would be fine with 47uF. 400V e-cap rating should be fine for unloaded rails (~370V max sim).

Preamp unit:

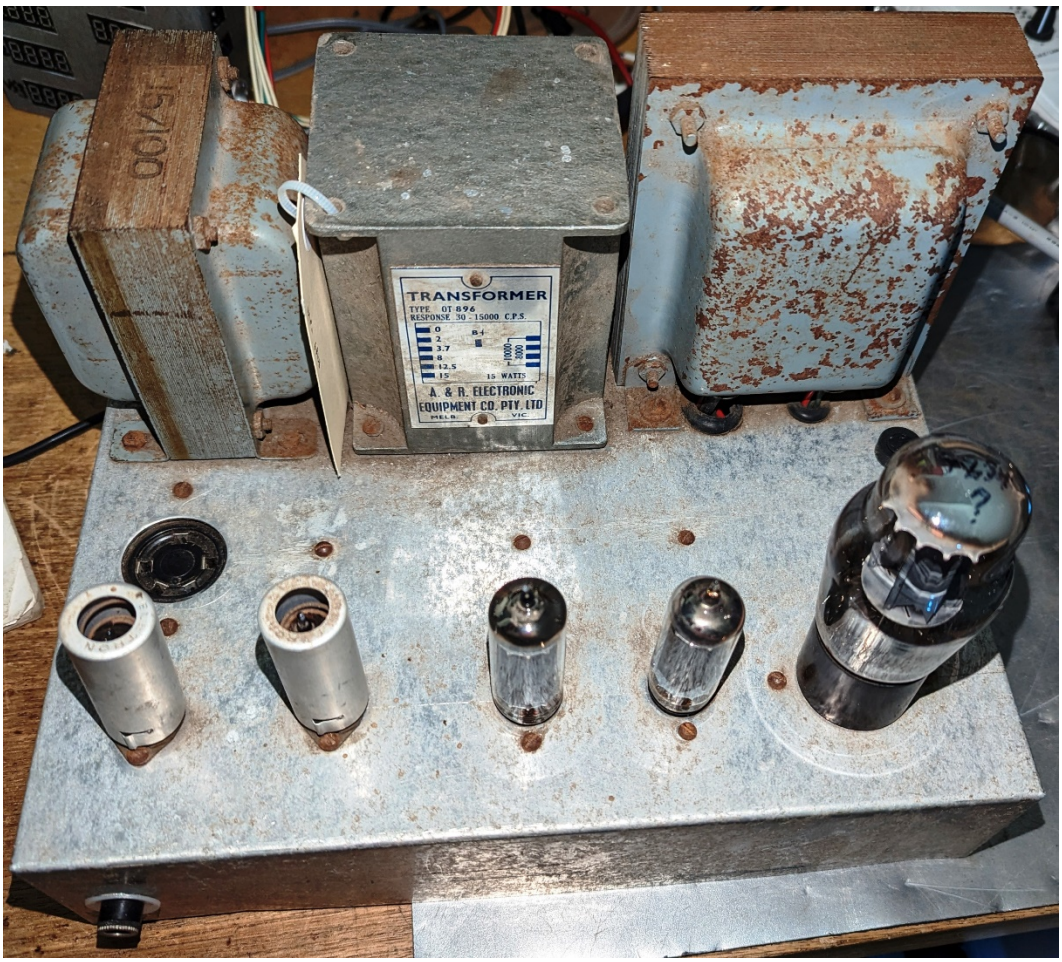
5-pin octal umbilical to main amp. 7-pin octal from radio (?). 2 signal inputs switched, then through 6AU6A triode mode, to 6J7G pentode mode, to 6C4 triode to 5-pin/main amp.

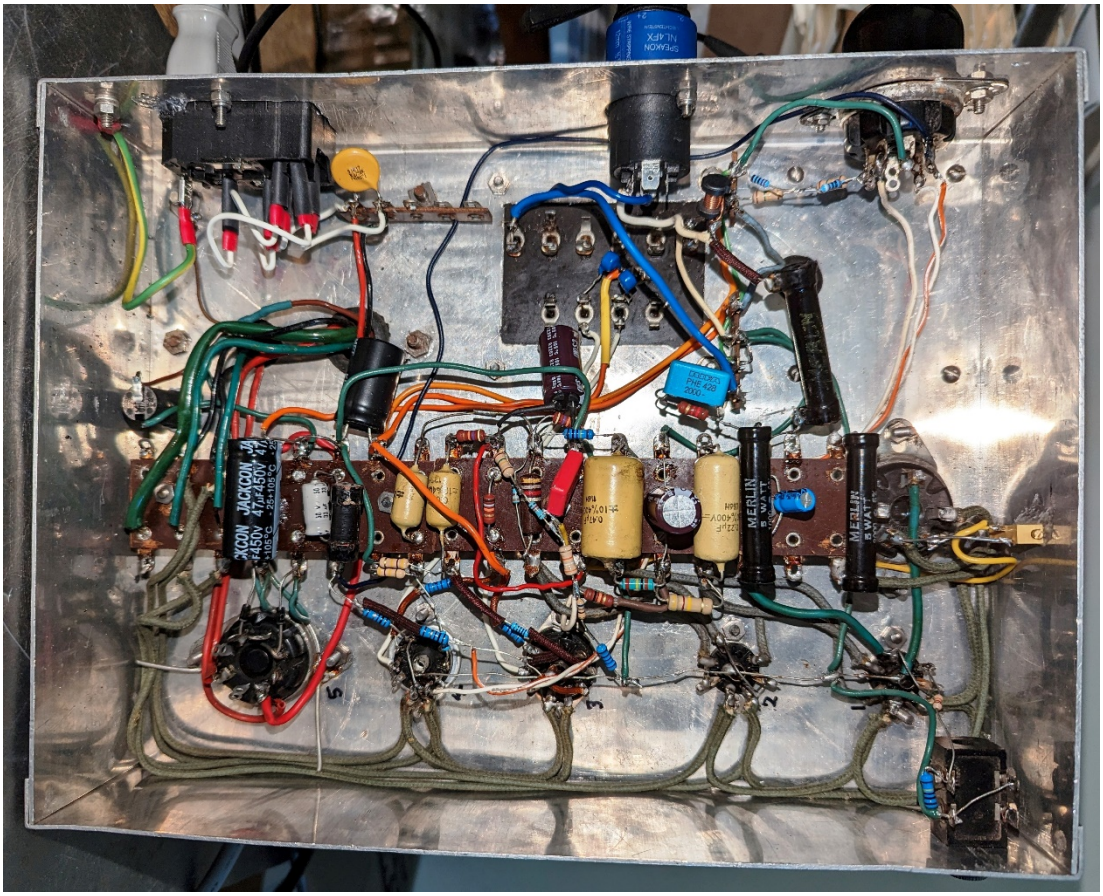
6AU6A, 6J7G, 6C4 (with shield)

2-way input selector switch to 6AU6A in triode mode (pins 2-5-6 linked), with 4k7 cathode bypassed. Output coupling cap to top of pot/tone with another pot - then to top grid of 6J7, with screen feed and bypass, and anode through coupling cap to first pot other end, and normal anode load R, and 4k7/0.1u RC to 6C4.

RC4 anode resistor to B+, and .1u coupling cap to pot to R to gang cap, and also through .02u coupling cap to pot with wiper to 5-pin socket, and other end grounded. Cathode with 1k2 to gnd. Input grid to 1 gang cap, then 220k to next gang, then 220k to next gang, to previous gang cap node. Gang cap perhaps for tone.

Preamp not tested or modified.


TRANSFORMER
TYPE OT 896
RESPONSE 30 - 15000 C.P.S.
A. & R. ELECTRONIC
EQUIPMENT CO. PTY. LTD


JACKSON
MERLIN
5 WATT

Measurements

1kV megger tests >400Meg on OT, and >700M on PT pri and sec, and >1G for choke. 6BW6 anode sockets leaky at 45M.

	240Vac 0.28Arms idle	240Vac 0.30Arms 10W o/p
VS1	320Vdc 0.06Vrms	307Vdc 0.11Vrms
VS2	258V	251V
VS3		
VS4		
Common cathode	19.4V	23.6V
6BW6 cathode current	31.9+32.3mA	38+40.6mA

Heater unloaded abt 6.9V, and HT about 295Vac.

B+ reaches 400Vdc with no valve loads and ss diodes, and falls to <40Vdc after 50 secs from bleeds.

Monitoring meter reads VS1 as 353V for 351V, and 271V as 270V.

With both 6AU6 in, then VS3 loading is 1.4mA (14V across 10k dropper). VS2 loading is 92V/27k = 3.4mA, with 0.8mA through bleed and 1.4mA to VS3, so 1.2mA loading.

For 15Ω tap and 5k6 feedback to 125Ω, the feedback level was 4.6dB.

Global feedback level (Rf disconnected for no f/b, as Rf connected to neg or gnd affects series inductor). 16R load.

- 1k2:125Ω gives 12dB F/B, and is borderline stable with 47nF only load with 1k2-1nF fb and no step networks, but needs 4.0uH 10T inductor.
- Squarewave response fine for 16R and 16R+47nF loading. No load shows minor higher frequency resonances. 47nF load shows dominant but damped ~145kHz resonance, which aligns with GP plot.
- No feedback GP shows dominant ~ -15dB/decade gain drop starting from ~10kHz to 130kHz, increasing to ~ -40dB/decade (with minor resonances). Phase shift starts above 1kHz, with 30deg at 10kHz, and 105deg at 100kHz, and 180 deg at ~ 400kHz at 30dB gain margin.
- 12dB feedback with 1nF comp and 10T shows flat gain to ~30kHz, with drop and plateau at -3dB out to ~110kHz, then ~35dB/decade fall, with minor resonances around 200kHz. Phase shift starts just before 10kHz and increases rate to -70 deg at 100kHz, then falls at faster rate, with 180deg at 360kHz ~20dB gain margin.

1st stage anode step network: 200k-66pF = 12kHz; 27k//200k-66pF = 100kHz not used
PI grid leak: 1M-33pF = 4.8kHz; 47k//1M-33pF = 107kHz not used
1k2 fb: 1nF comp 133kHz (better GP than 470pF); 470pF comp 282kHz.

Test results with 4T (0.80uH), 6T (1.6uH), 8T (2.5uH), 10T (4.0uH) from modified ELC08D220E (22uH 10%), with combinations of:

- No load, 47nF, 16R, 16R//47nF
- No feedback, 1k2, 1k2//1nF feedback
- 27k+66pF step across first stage anode load
- 47k+33pF step across 1M grid leak on PI stage

520mV for 4.07V 1W output into 16R with 0.14% H2 and 0.08% H3, increasing to 0.51% and 0.58% at 4W. Start to notice clipping above 12.8V (10.2W), - abt 1.6Vrms input for 10W output with so-so (but idle matched) 6BW6. Noise floor at least -110dB below 8V (4W) fundamental.

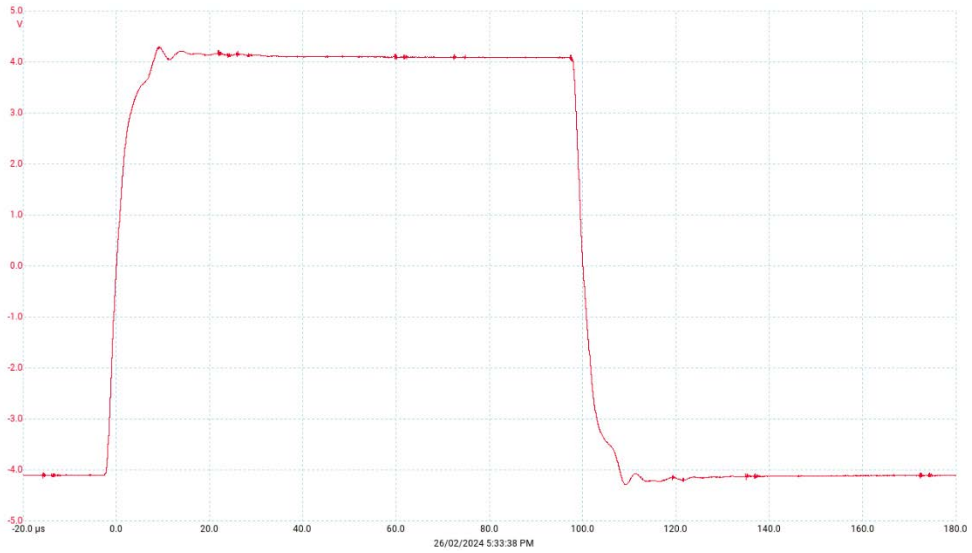
Humdinger pot has no noticeable effect.

PSUD2 simulation based on 285Vac secondary with VS1 loading of 100mA (2x35 = 70mA idle), with hot turn-on. IEC60127-2 0.2A T fuse chosen.

Simulate period in PSUD2	**20ms**	**150ms**	**600ms**	**continuous**
Simulated RMS current	0.95	0.55A	0.34A	0.185A
Multiplier (based on 0.2A fuse rating)	4.8	2.8	1.7	0.93
IEC60127-2 Time-lag T min limit multiplier	10	4	2.75	1

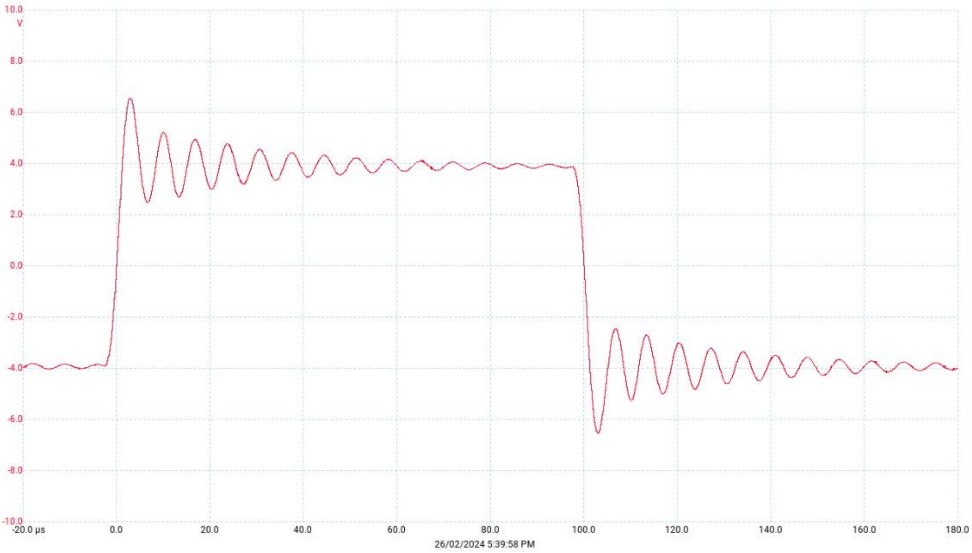
Squarewave and gain-phase responses use PicoScope 4224A and either PicoScope 7 T&M or FRA4picoscope software. TA375 probes 10:1.

1W squarewave response, 16Ω.

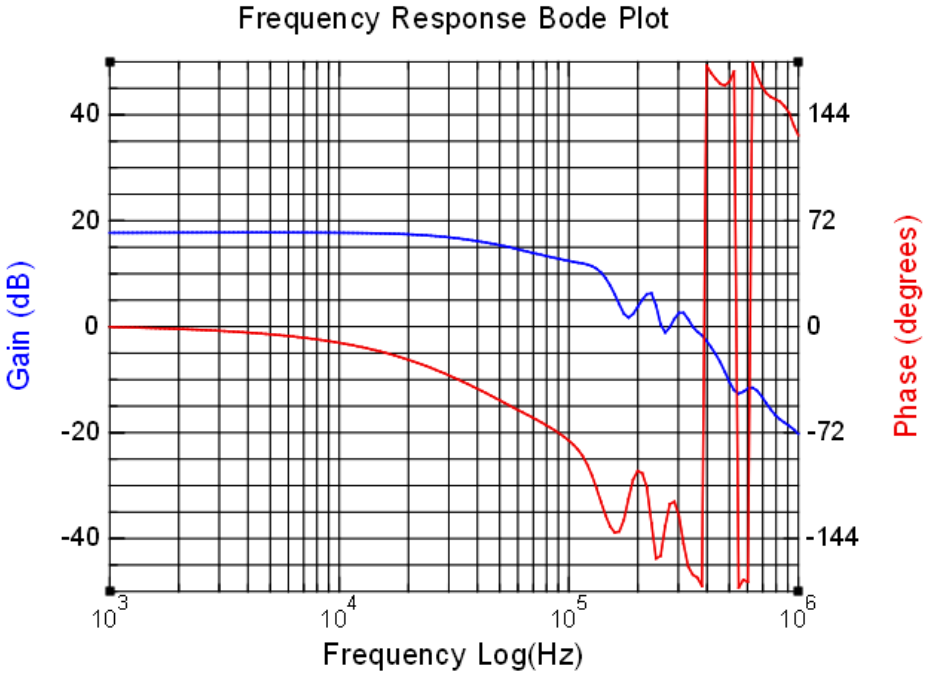


Worst-case squarewave response for 47nF only loading.

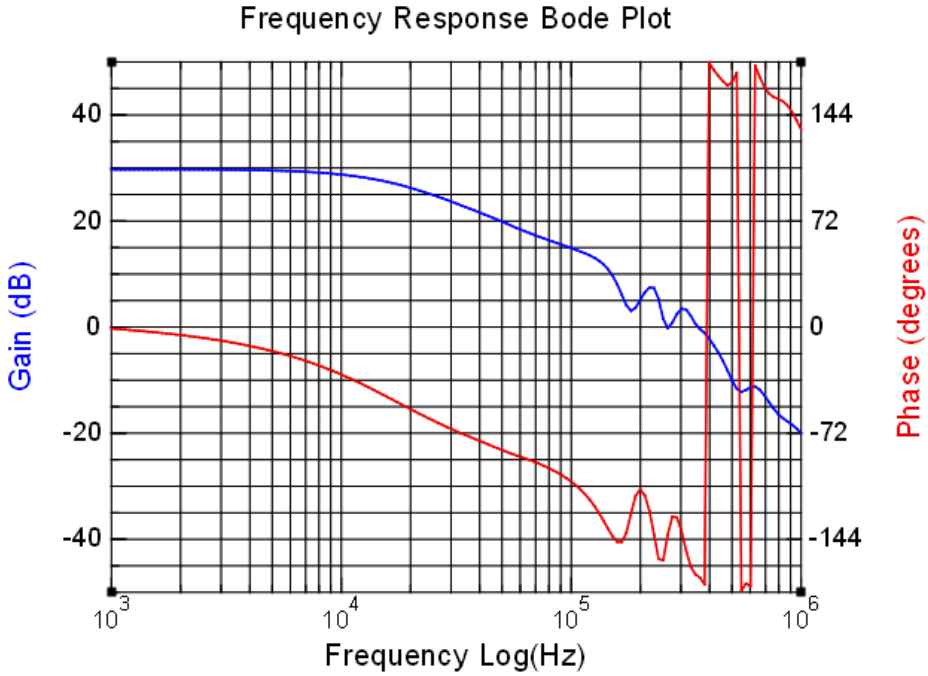
~130kHz dominant (but damped) resonance – see later gain-phase plot.



1W gain-phase response, 16Ω, 12dB feedback.

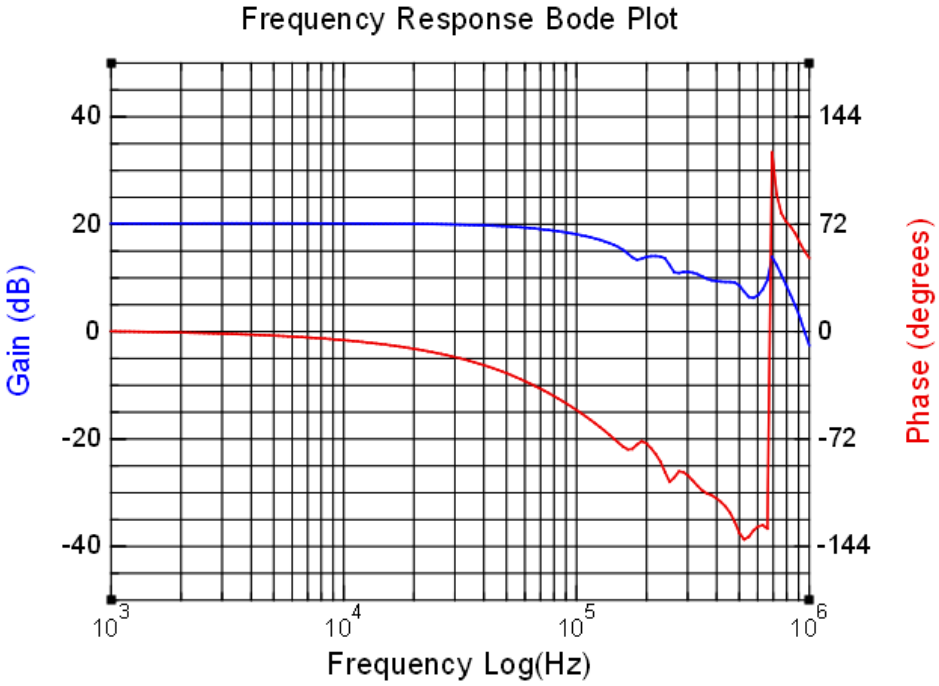


1W gain-phase response, 16Ω, no feedback.



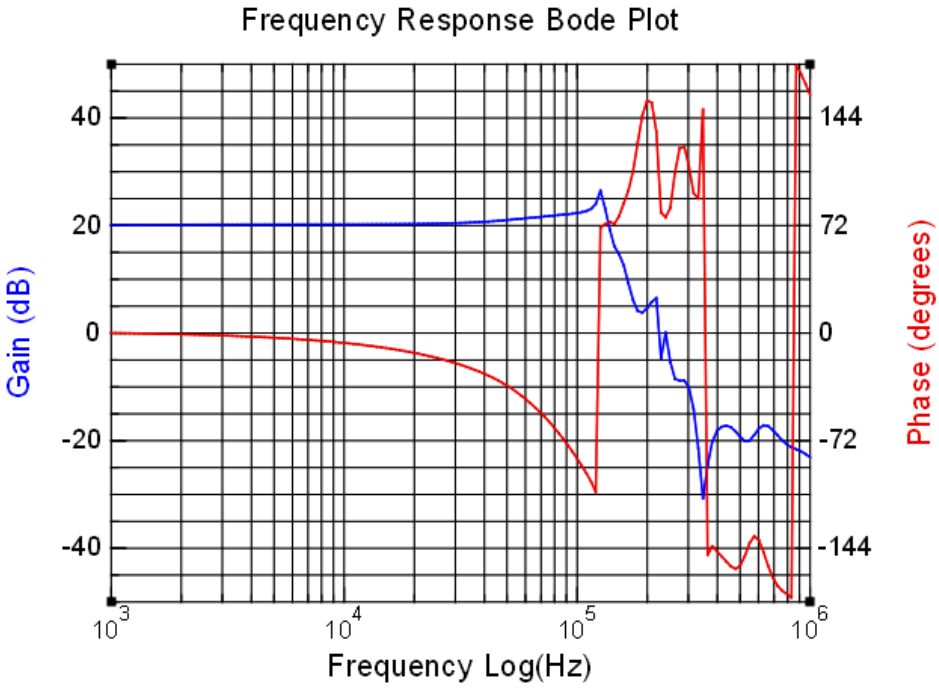
4V o/p gain-phase response, no load, 12dB feedback.

~ +2dB midband gain.



4V o/p gain-phase response, 47nF only load, 12dB feedback.

Marginal stability, with ~120kHz dominant resonance.



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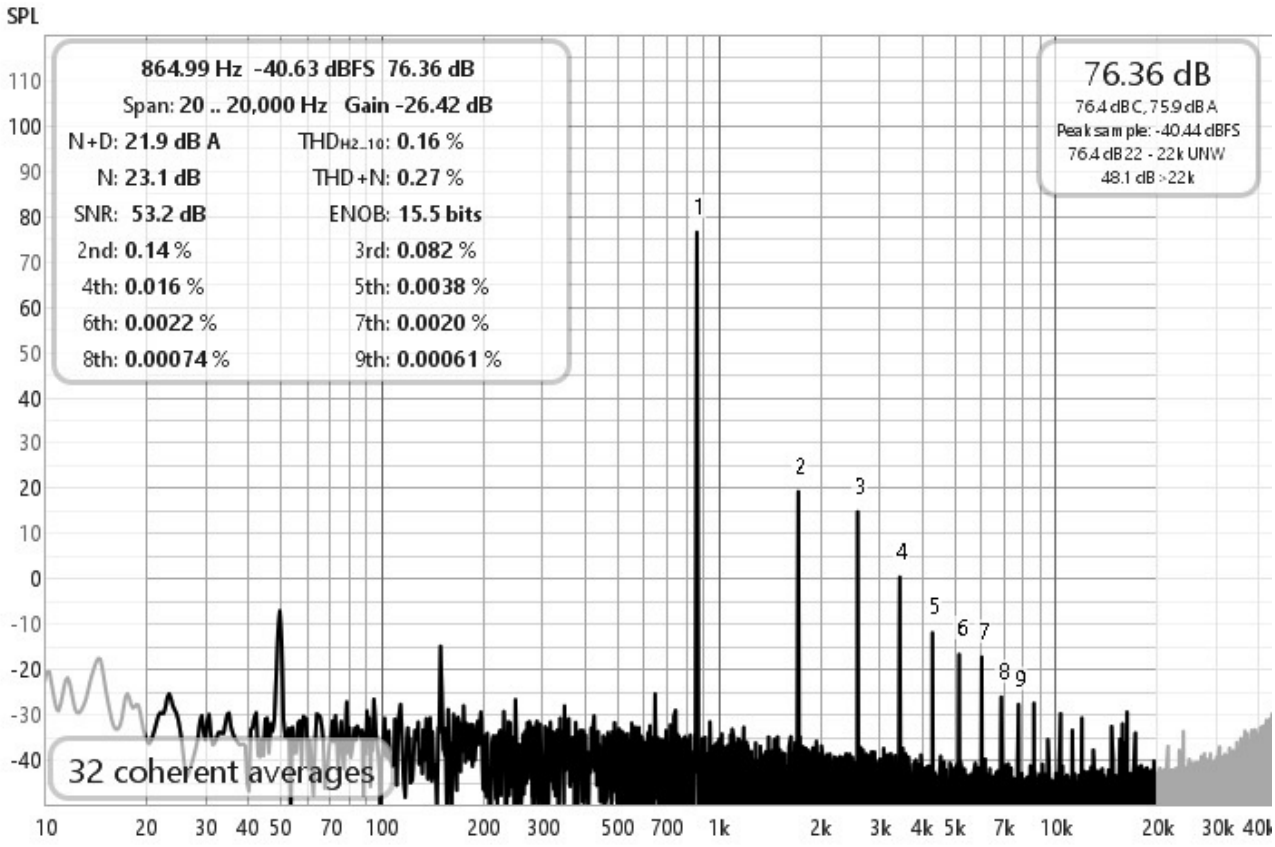
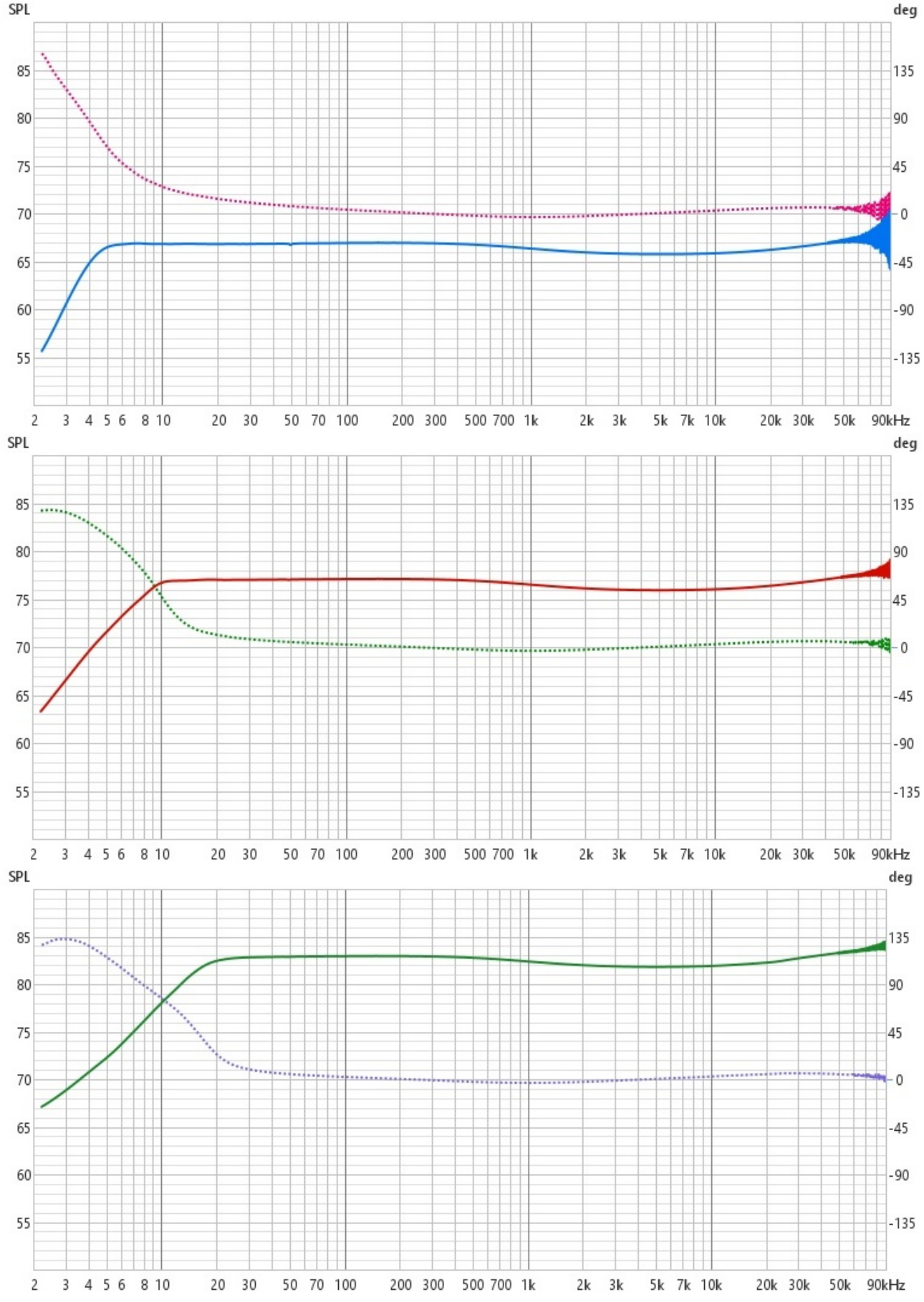
Spectrum and sweep plots use EMU 0404 USB and REW software.

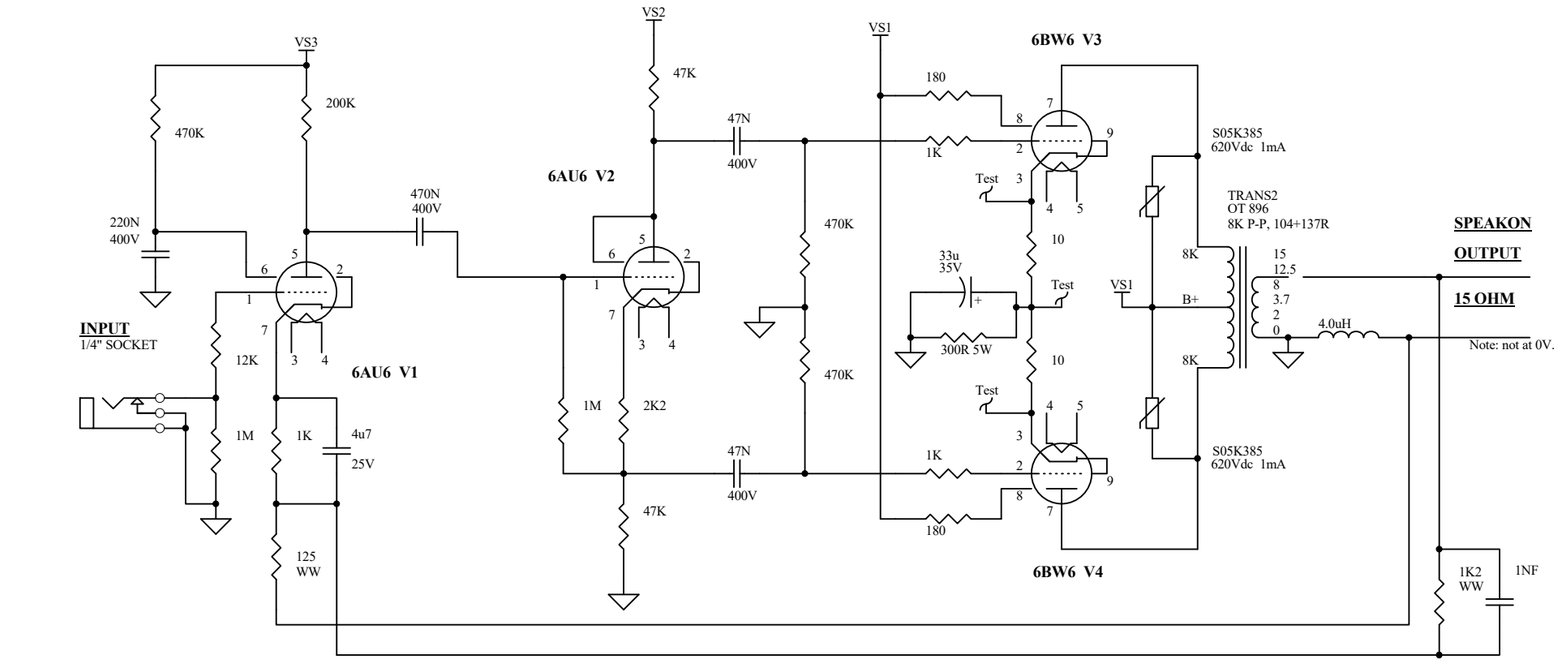
Harmonic structure for 1W into 16Ω, with 12dB feedback.

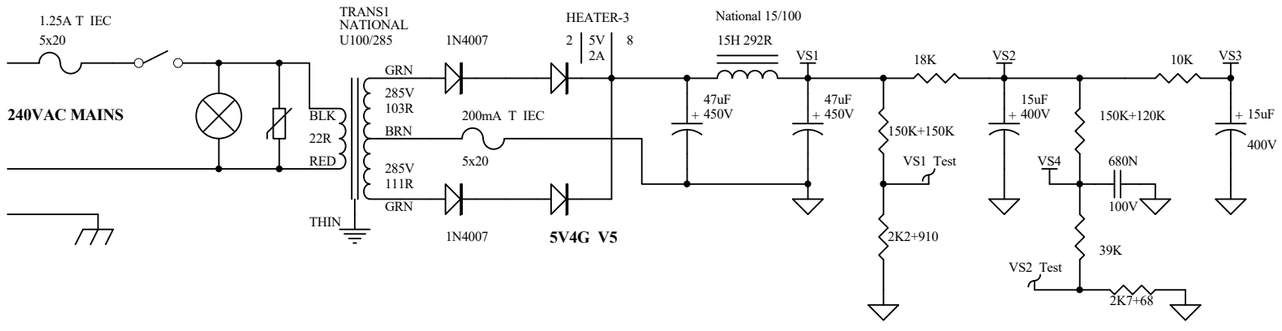


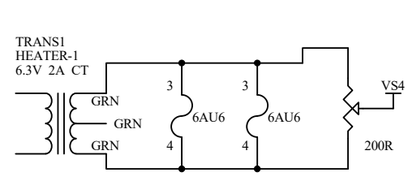
Frequency response at 0.1W, 1W and 4W for 16Ω load with 12dB feedback. Note change in low-frequency corner gain and phase due to output transformer.

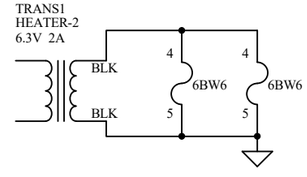


R&H 1954 Standard No.1 Amp Modified
August 1954
MODIFIED





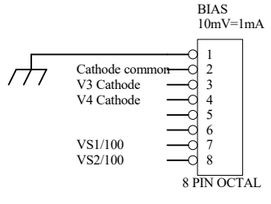




VOLTAGE RAILS

RAIL	NO LOAD
VS1	340V
VS2	290V
VS3	275V
VS4	45V
V3 idle	35mA
V4 idle	35mA
V3,4 common	18V
HEATER-1	V

VALVE	QTY
6AU6	2
6BW6	2
5V4G	1



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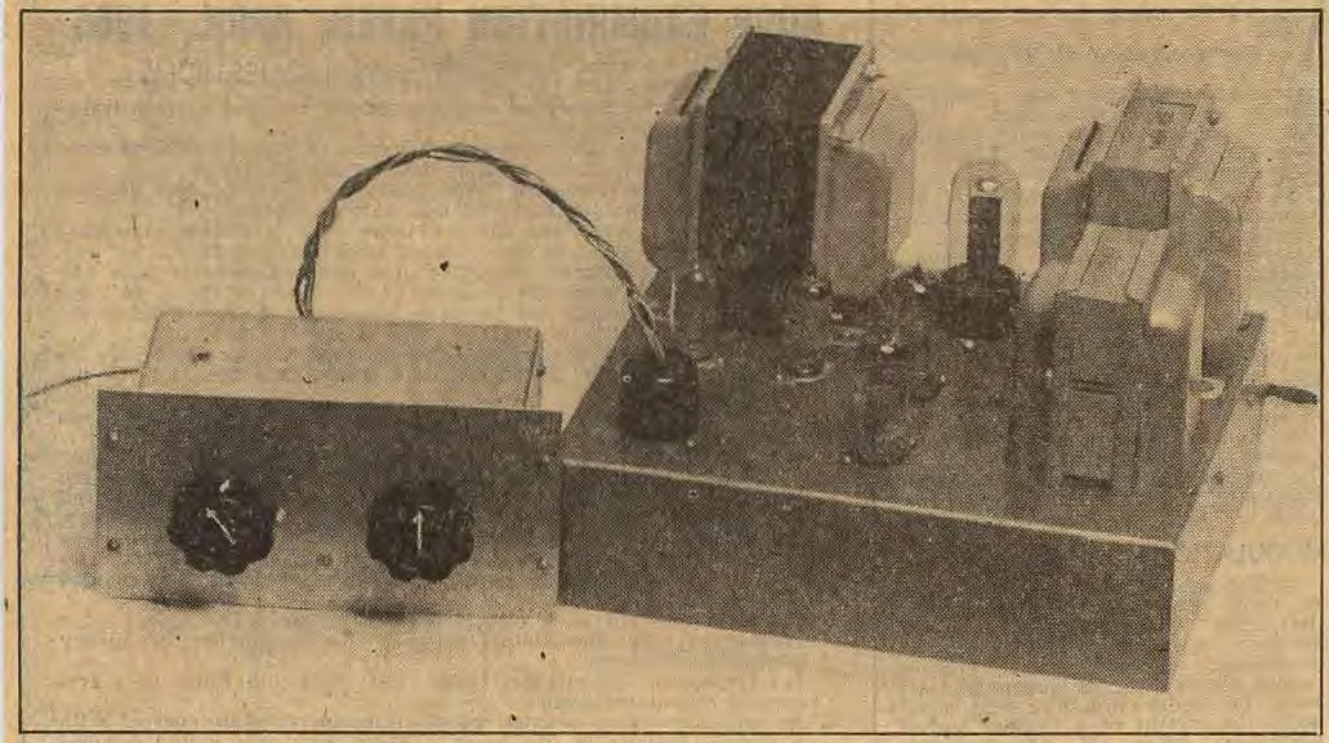


The "Standard No. 1" amplifier is built on the same chassis as the "Playmaster Seven" but uses less expensive power and output transformers. With it is the "Control Unit No. 5", which is equally adaptable to either the Playmaster or the new Standard series of amplifiers. It is a modernised version of the original Control Unit No. 1.

GOOD QUALITY AT LOWER COST

Can you make an amplifier reasonably priced and still get good quality? We think you can. This, the first Standard design, exploits the use of medium quality equipment, thus bringing good sound within the reach of almost any reader. While not quite as good as the famous Playmasters, you need not apologise to anyone for the results you will get from this simplified and more modest equipment. And you can build on the design without waste if later you wish to go really "high fidelity".

TYPICAL of folk we have in mind is the reader from Wagga Wagga, NSW, who has this to say:

"In common, I feel sure, with a large number of your readers, I am very fond of recorded music and like to hear it played on good quality equipment. However, after meeting our commitments, we are either not in a position or not prepared to invest such a large sum of money in a record playing unit."

He then goes on to suggest that we could trim down some of the extreme frequency specifications of the Playmaster series without seriously degrading the performance. In doing so, we might bring the total cost somewhere nearer to what he, for one, can afford.

Our correspondent is, we think, both right and wrong.

He is right in believing there are many readers who simply can't afford "the best that money can buy", no matter how much they might like it.

But he is wrong in presuming that the net cost ties itself so intimately to the design of the amplifier. In point of fact, it has more to do with the auxiliary gear, notably the pickup and speaker.

Let us analyse the position a little more closely:

The circuitry of the whole Playmaster series deliberately avoided complicated balancing and inversion circuits and over-ambitious feedback loops, because we reckoned that they could not be justified from the listener's point of view, and often lead to trouble in home building.

SIMPLE UNITS

We kept the control units simple, too, rejecting the obvious tendency to make them very clever from the front, but a hopeless mass of components from the rear, at least to the average eye.

By omitting the extra bass and treble knobs from the control unit, which though useful are not essential, cost can be considerably reduced while still retaining the essential feature of proper compensation for the various types of discs. We save two switches, numerous small components, reduce size and gain in simplicity. Expansion to a larger unit is always possible later without loss.

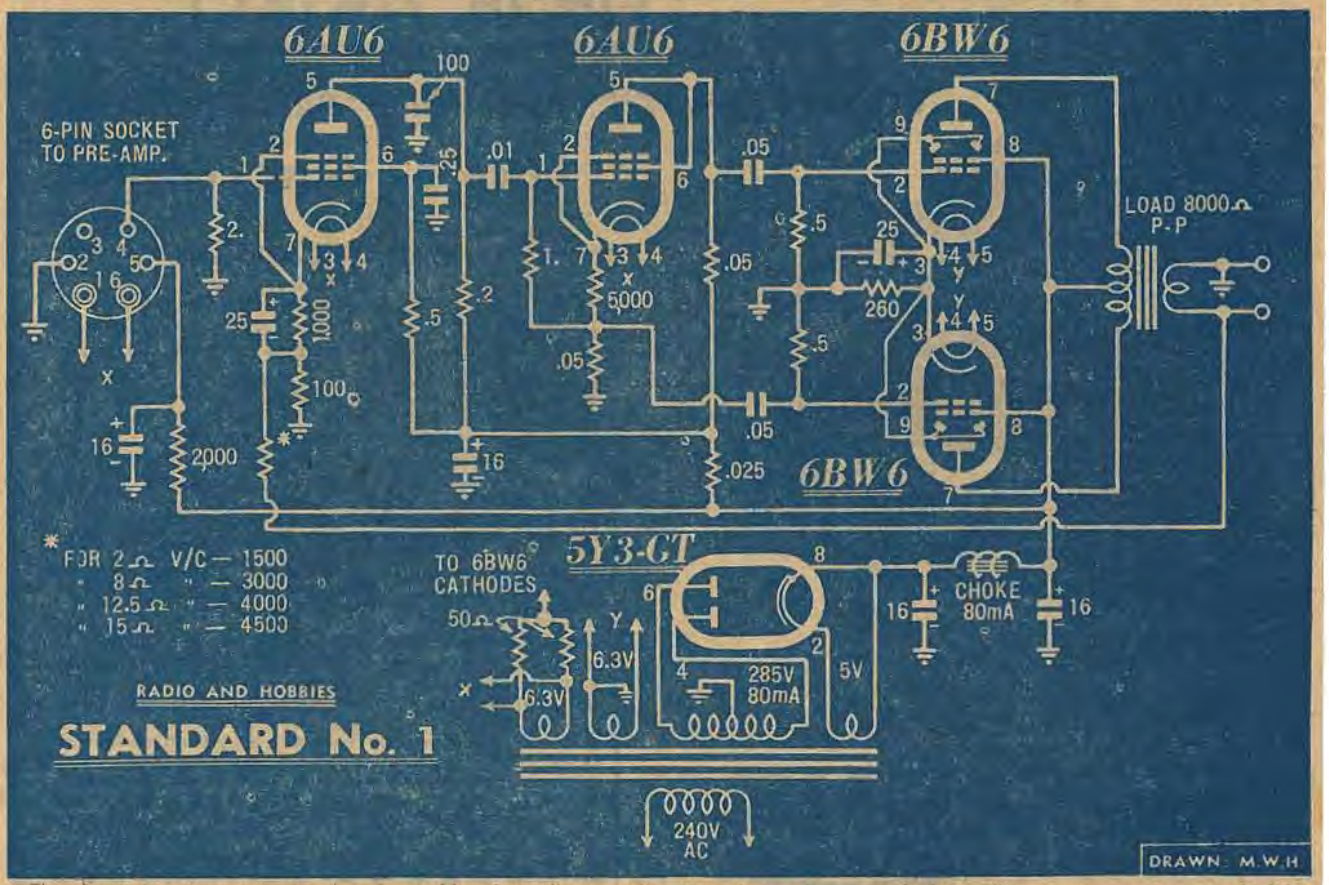
One can't hope to save much by trimming resistors and capacitors out of designs like last month's Playmaster Seven, or the simpler control units. Indeed, if any saving is to be made at all in the amplifier, it would have to be in the transformer equipment.

For instance, we specified a 125mA power transformer for the Playmaster Seven on the grounds that it would have an ample margin on current rating, even when supplying the main amplifier, a control unit, and a tuner of one kind or another.

We could have got away with a 100mA. unit quite safely, but, in general, readers who are prepared to pay twenty or thirty pounds for a speaker and more than that again for a pickup and motor, generally prefer to be liberal with component ratings.

If, however, there is no intention of running a tuner from the same supply, the transformer and filter choke can come down quite

CIRCUIT OF THE STANDARD AMPLIFIER NUMBER 1



The circuit is quite conventional and capable of excellent results. Note that we have specified 80-milliamp power equipment, which is adequate for the amplifier and control unit. If it is anticipated that a tuner will be used, it would be wise to buy a 100-milliamp power transformer at the cost of a few shillings.

safely to 80mA., with a considerable saving in first cost. As a compromise, a 100mA. rating should cover the needs of amplifier and tuner, with the manufacturer's own tolerance still in hand.

The other big item is the output transformer, which can run away with quite a few pounds. Once again, the urge to buy "nothing but the best" is very strong among those who have already invested in an expensive speaker. They like to think that the transformer is completely flat from here to there and never likely to be overloaded at any point in the range.

How far can one afford to retreat from this attitude by way of compromise?

The answer to this is often bound up in the speaker which it is proposed to use.

CUTTING COSTS

If the intention is to keep down the overall cost, there can be no question of paying out twenty or thirty pounds for one of the very high quality units—not immediately, anyway!

Logically, the choice narrows down to two or three locally-made or imported types ranging in the £6 to £10 class.

There's no need to despise these speakers because of their comparatively lower cost. They are used in the highly priced commercial Super De-Luxe radiograms, and one can make them sound very pleasant indeed by correct baffling and by feeding them with a balanced signal.

What is more, we wouldn't be at all surprised in the near future to see some tweeters come to light which will nicely supplement their high frequency response, if necessary.

The important point is that most of these speakers are not intended to handle more than about five or six watts of power, which is frequently ample for the ordinary home.

If one is, therefore, prepared to acknowledge this limited power capacity and also a limited performance below about 50 and above about 10,000 cps, then one can logically begin to scale down the requirements of the output transformer and with it, the cost, without spoiling good quality.

We can rely on voice coil feedback to straighten out the frequency response to better than manufac-

PARTS LIST

1 chassis 9½in x 8in x 2½in (Playmaster Amp. No. 7 chassis).
1 power transformer 285V a side 80mA, 6.3V 2A, 6.3V 2A, 5V 2A. (use 100MA type if tuner is anticipated).
1 80mA filter choke. (100 mA if tuner is used).
1 output transformer 8000 ohms P-P speaker voice coil impedance.
2 7-pin, and 2 9-pin miniature valve sockets, 1 6-pin plug and socket, 1 4-pin miniature plug and socket.

VALVES

2 6AU6, 2 6BW6, 1 5Y3-GT (5V4-G rectifier preferred where tuner is to be used).

CAPACITORS

2 25 mfd 40PV electros, 4 16 mfd 525PV electros, 1 .25 mfd 350VW, 3 .05 mfd 400VW, 1 100 pf.

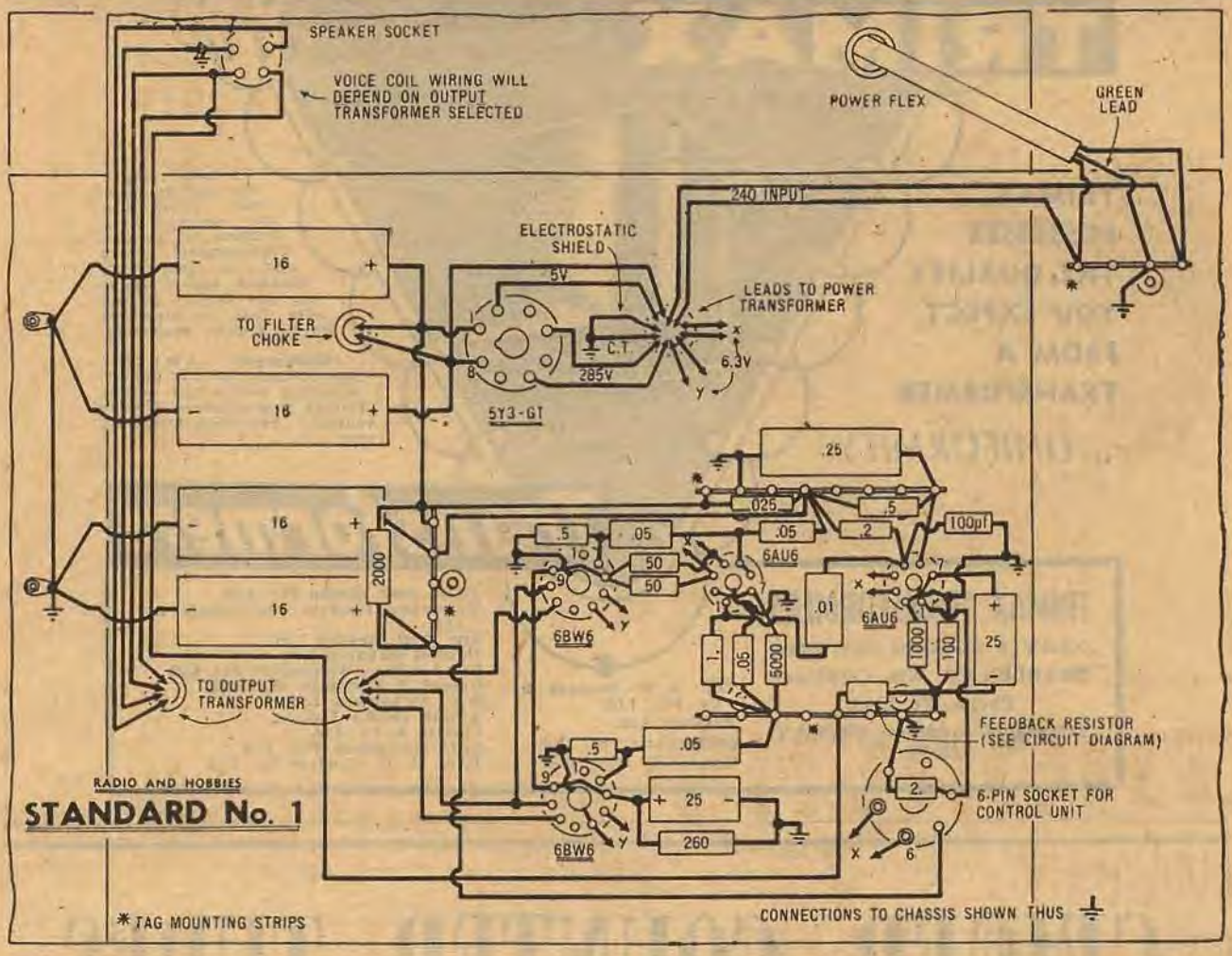
RESISTORS

1 2 meg., 1 1 meg., 3 .5 meg., 1 .2 meg, 2 .05 meg., 1 .025 meg., 1 5000 ohm, 1 2000 ohm 3 watt (or 2 4000 ohm 1w in parallel), 1 1000 ohm, 1 260 ohm 3 watt, 1 100 ohm, 1 50 ohm 3 watt centre-tapped voice-coil feedback resistor. (All carbon resistors ½ watt).

SUNDRIES

2 8-tag, 1 5-tag and 1 4-tag mounting strips, power flex and plug, nuts, bolts, star washers, solder lugs, solder, spaghetti insulation, hook-up wire, tinned copper wire.

WIRING DIAGRAM OF THE NEW STANDARD AMPLIFIER



We do not usually prepare wiring diagrams for our amplifiers but this one proved rather easy to draw. It should greatly assist readers who are not too certain about working to schematic circuits. With one or two minor changes, the diagram also applies to the Playmaster Seven featured in the June issue.

turer's ratings, but the transformer still must be capable of handling adequate power at low frequencies.

It really boils down to the amount of iron in the core, and copper in the winding. Size is significant.

CHEAP TRANSFORMERS

The cheapest transformer will, undoubtedly, be the type which is sometimes available with the speaker, often for just a few extra shillings. While we have not taken these too seriously in the past, it is, nevertheless, true that the largest of these, designed for push-pull operation, aren't too bad.

On test, one such transformer gave a fairly level response from about 40 to 40,000 cps, the main weakness being a tendency to overload at about three or four watts in the 40-cycle region. At moderate power, however, it would be quite acceptable and well worth a trial if you want to get the costs right down.

Checking through the lists of brand line transformers, we came across a couple of types for medium power speakers such as the 12OX, which carry good frequency ratings and, on test, handle reasonable power at low frequencies. Transformers like this would be excellent for the usual domestic installation.

Some of the "PA" types carry more liberal power ratings, but have a more restricted response. With overall feedback, their response should also be quite good, though perhaps a few decibels below what we demand of high fidelity types.

The transformer in position when the photograph was taken is one made up specially for this amplifier. It has a primary impedance rating of 8000 ohms and a nominal power rating of 10 watts. It employs a sectionalised winding and it is the manufacturer's intention to release it with alternative secondary windings of 12.5 and 15 ohms for Jensen and certain imported speakers, or two and eight ohms for speakers in the Rola range.

These figures may also suit various other speakers.

The price of this transformer is a little higher than the PA types, but much less than the true "wide range". It is ideal for the "in-between".

Obviously, this leaves a good deal to individual choice, but, by selecting one of the less expensive speakers and an adequate — but not luxury—transformer to go with it, a very big sum can be sliced off the total cost.

At the input end the same kind of compromise has to be made. Pick-ups and motors vary in price by more than three to one, and, in general, performance and characteristics follow fairly closely on the price class.

There is the point, of course, that crystal pickups can get by with less overall gain than magnetics, but the story doesn't quite end there.

OUR APPROACH

Any design that we sponsor for general use should really be capable of accommodating both. Added to this is the desirability of achieving something like proper balance for radio and for the various types of recordings.

To cut a long story short, we reckoned that the best approach at the input end was to retain the style of the Playmaster amplifiers and provide for a control unit. In this way, we could get enough sensitivity for variable reluctance pickups like the

new Goldring, without running into hum troubles.

Readers could provide a simple unit to start with and expand it later to suit themselves.

Our immediate suggestion, as you can see, is a modernised version of the original No. 1 unit. You can build it in a small box, as shown, or fit it into a larger one, with the idea of expanding it later.

Such then is the story behind the Standard amplifier, which should appeal to yet another large section of our readers.

In building the amplifier, we used the same chassis design as for the Playmaster amplifier No. 7, of the June, 1954, issue, while the control unit was made up on the same metalwork used for the Playmaster Control Unit No. 1, of the October, 1951, issue.

NEW BRACKET

Neither design required modification other than a new bracket for the control unit to take care of the smaller size of valve socket. We could have fitted a plate over the octal-sized hole in the original plate, but in bending up a new bracket we took the opportunity to reduce its depth from 2 7-8in to 2¼in, to make more room for mounting an indicator lamp, as in the Playmaster Control Unit No. 4, of the June, 1954, issue.

With the ready-made amplifier chassis, some drilling will be necessary to mount the power transformer, filter choke and output transformer. Due to the variation in position of mounting holes for different brands of these components, we thought it best to leave it to the individual constructor to drill the mounting holes and lead-through holes to suit the particular brand of components used.

However, we suggest that you mount the valve sockets in place before these heavy components are secured, simply because it is a little more convenient. Note that all sockets except the speaker socket have a particular orientation, as shown in the underchassis wiring diagram. This allows for a logical progression of the wiring and a neat and convenient layout of the minor components.

Make sure that the bolts holding the sockets, tag mounting strips and chassis earth points are in good contact with the chassis, bearing in mind that ready-made chassis are sprayed at the factory. A good idea is to use a star or spring washer, preferably the former, under the head or nut of a bolt, whichever is in contact with the chassis.

Some of the socket securing bolts will carry a solder lug. The underchassis wiring diagram will show which particular bolts are involved. Later, before you commence the main wiring job, all solder lugs, the metal surround of the larger sockets and certain earth lugs of the tag mounting strips may be connected together with a run of light gauge tinned copper wire to guard against trouble at a later date, should one or more earthing point fail to retain good contact with the chassis.

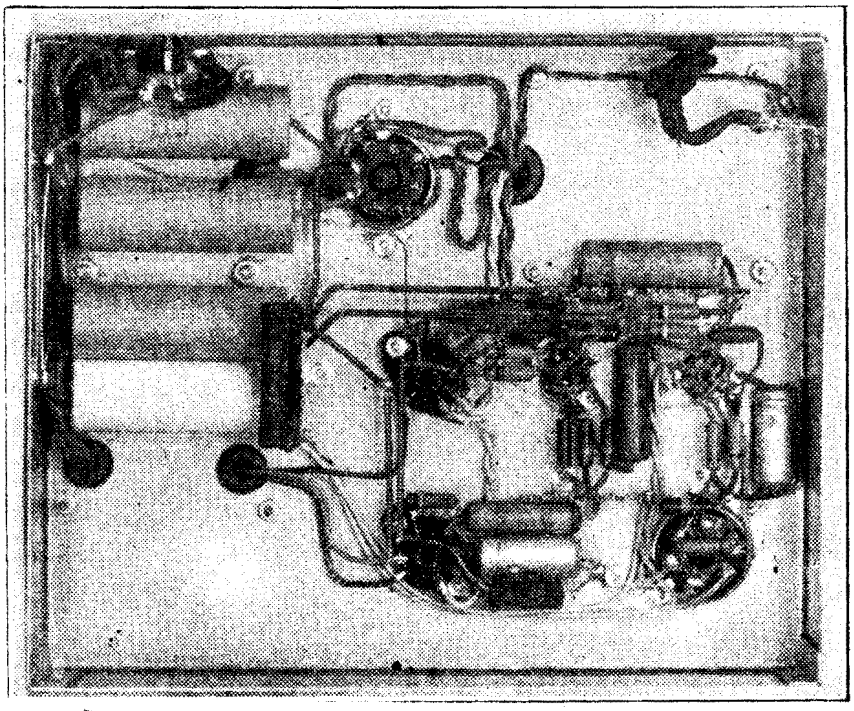
HUM PICKUP

Mount the power transformer and filter choke to the chassis, the power transformer position being behind the 6AU6 valves. Before securing the output transformer, a check should be made for hum pickup, if any, from the field of the power transformer.

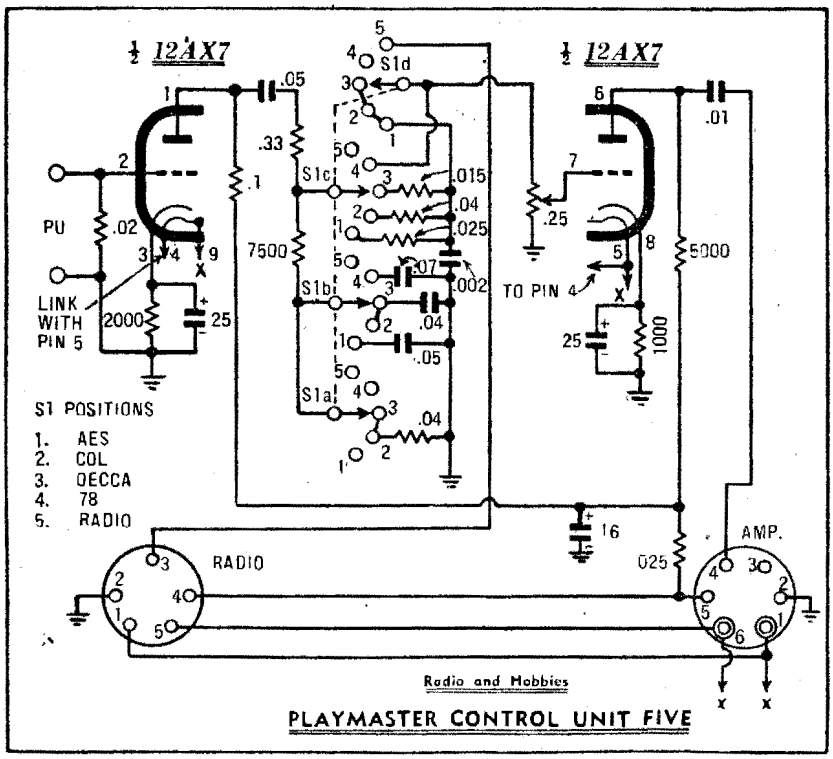
Although for this test you need only to connect the mains to the power transformer primary winding, you may as well, for safety sake, trim the other leads and lay them in place around the rectifier socket.

The earthing of the electrostatic shield of the power transformer is shown in the wiring diagram, but not in the circuit diagram. The incoming mains lead connects to the transformer primary at a tag strip secured to the side of the chassis.

VIEW UNDERNEATH THE CHASSIS



And this is how the finished amplifier should look. Having wired the main amplifier with the aid of our wiring diagram you should be in a better position to tackle the control unit which goes with it.



Here is the circuit of the Control Unit No. 5 which retains the name "Playmaster". To build it, we simply stripped down the original Control Unit and rewired it to include specific compensation for the more important recording characteristics.

Note that 3-core power flex is shown in the wiring diagram to provide a connection between the amplifier chassis and the house wiring electrical earth system. The green-colored wire in the flex is usually considered as the earth wire.

Temporarily connect the secondary winding leads of the output transformer to the speaker through an appropriate length of lead and roughly position the transformer on the chassis, arranging the primary leads so that they do not short to themselves or to the chassis.

Plug the mains lead into the power socket, and, while listening in the speaker, choose a position for the output transformer which gives minimum hum induction. Ideally, the speaker should be mounted in its baffle or enclosure.

In our test, we found that we could mount the output transformer in a position which also suited layout symmetry as its field is not as great as the larger high fidelity types.

Incidentally, you should select your output transformer to suit the voice coil impedance of the speaker. Transformers are available to suit the nominal 2 ohm, 8 ohm, 12 ohm and 15 ohm impedance values, usually two values being available on one transformer.

TWO VALUES

In the underchassis photograph and wiring diagram, we have shown the wiring for two voice coil impedances going to the speaker socket. This anchors the unused leads and allows selection of impedance values according to the wiring to the speaker plug.

The two 6.3-volt windings on the 80 mA power transformers are employed to give separate heater circuits for the 6BW6 valves and for the 6AU6 valves and the 12AX7 in the control unit.

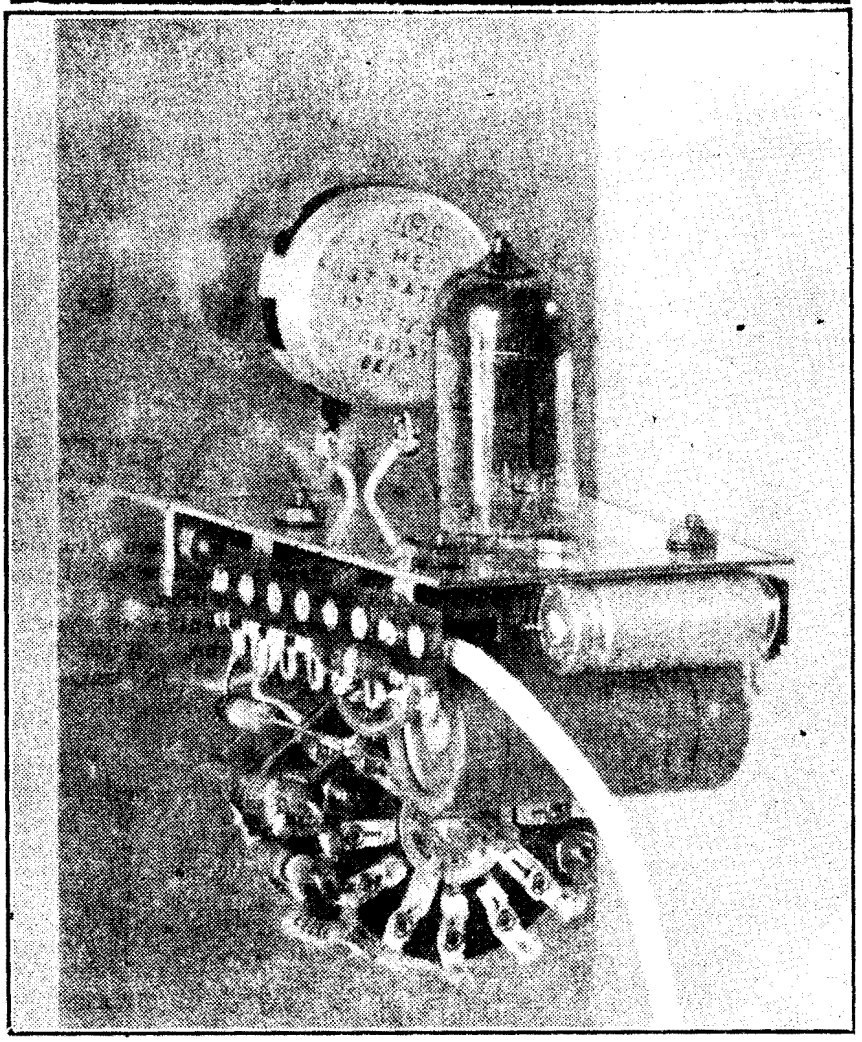
Unfortunately, the 80 mA size of power transformer does not normally carry a centre-tapped 6.3-volt winding, and it is necessary to provide an artificial centre-tap for the winding feeding the 6AU6's and the 12AT7 so that it can be held positive to the cathodes by the amount of bias supplied to the 6BW6's. This minimises hum injection into the early stages.

We used a pair of 50 ohm ½-watt resistors for this purpose. Lower values would need to be the 1-watt size. A 50 ohm centre-tapped wirewound resistor could be used if available.

Before laying in the minor components, complete the heater circuits to the valve sockets and the 6-pin socket to the control unit and earth the centre spigots of all miniature valve sockets. One side of the heater circuit to the 6BW6's may be earthed via the spigot of one of the sockets.

The wiring diagram shows the use of tag mounting strips to provide convenient support for the minor components and their junctions. The junctions of the filter choke and the filter capacitors are made at pin eight and an adjacent pin of the rectifier socket.

INSIDE VIEW OF CONTROL UNIT



It is very difficult to illustrate properly the wiring of a control unit because it groups around switch contacts and valve pins. The safest approach is to set the switch to each position in turn, note the position of the wipers and wire each setting completely to correspond with the diagram. A mark on the panel to identify each position is also a good idea to save confusion.

PARTS LIST

1 panel 7in x 3½in with bracket 3½in x 2½in.
1 Case 6in x 3in x 3½in deep.
1 switch, 2-pole, 5-position, 2-section.

VALVES

1 12AX7 valve.
1 9-pin miniature valve socket, 1 6-pin and 1 5-pin plug and socket.

CAPACITORS

200VW 10 pc: 1 .07 mfd, .05 mfd, 1 .04 mfd, 1 . 002 mfd (some values obtained by paralleling).
Others: 2 25 mfd 40 PV and 1 16 mfd 350PV electros, 1 .05 mfd and 1 .01 mfd 350 or 400VW.

RESISTORS

½ watt 5 pc: 1 .33 meg., 2 .04 meg., 1 .025 meg., 1.015 meg., 1 7500 ohms.
½ watt: 1 .25 meg., potentiometer, 1 .1 meg., 1 025 meg., 1 .02 meg., 1 5000 ohms, 1 2000 ohms, 1 1000 ohms.

SUNDRIES

2 1½in knobs, panel light, holder and bezel (if required), 2 8-tag mounting strips, engraved front panel, shielded hook-up wire to pickup, 3 countersunk bolts and nuts, spaghetti, hook-up wire, nuts, bolts, solder, etc.

Watch the polarity of all electrolytic capacitors, remembering that the red end is positive.

There is not a great deal in the wiring of the amplifier and ample space is available. Try to arrange the components in a neat and orderly fashion. Take care with all soldered joins and see that scraps of solder do not remain where they may short portion of the circuitry to chassis.

WIRING

The wiring of the control unit is not difficult once you have allocated the sections of the switch to their various tasks. As a guide here, we combined sections S1a and S1d on the bank close to the clicker plate, with sections S1c and S1b on the outer bank in that order, that is, S1c is directly above S1a looking on the back of the switch.

All earth connections of this switch are taken to the clicker plate for convenience. This does simplify construction, even though it conflicts with the theoretically desirable single-earth-point technique. There

(Continued on Page 108)

RECORD REVIEWS AND RELEASES

(Continued from Page 93)

BRAHMS—Symphony No. 1 in C Minor, Opus 68. Played by the Berlin Philharmonic Orchestra conducted by Joseph Keilberth. Radiola-Telefunken LSK 7008.

Judged as a standard Brahms performance, this is quite a good disc. The recording is handled well, and general balance is satisfactory except for a few spots where an undue intrusion of secondary parts tends to spoil cohesion. It is fairly forward —perhaps a little too much so to smooth out the moving current so typical of Brahms.

I would have liked a bit more bite to the playing, and flexibility on the conductor's part. I had the feeling that for many bars he was doing little more than beat time. He could have demanded more precision in attack, with advantage, although he must have been well satisfied with the tone quality of the soloists.

It plays best on the EMI setting with a little extra bass, if this can be managed. A couple of tape joins are rather obvious. There is no deterioration of quality near the centre, and apart from a just noticeable hum level, extraneous noises are low.

DEBUSSY — Suite Bergamasque. RAVEL—Gaspard de la Nuit, played by Frank Glazer, pianist. Nixa QLP 4005.

Debussy and Ravel were possibly the two most important of the French impressionists who exploited the movement away from traditional tonality and created a new conception of musical color.

Neither of these suites presents a cohesive mental picture, being more collections of tone pictures. But they form a very good example of the similarities and differences of these contemporary composers.

Frank Glazer presents them in a somewhat matter-of-fact manner, but I would sooner hear them that way than tinged with the drool one often hears with music of this type. He may not be a Gieseking, but he is a most competent pianist all the same.

The recording is very good, another illustration of the fact that the piano isn't the recording bogy it used to be. There is enough reverberation to help sustain the tone as it should be done, and there is no surface noise. A good record.

DVORAK—Violin Concerto in A Minor, Opus 53. Played by George Kulenkampff and the Berlin Philharmonic Orchestra conducted by Eugen Jochum. Radiola-Telefunken LSK 7004.

Kulenkampff will be remembered by many as far back as pre-war days for his fine recordings issued by Telefunken which, in their time, were outstandingly good. They are still good, but this version of the Dvorak seems to date well before the modern microgroove. I would say it is a redub from an early release, and it suffers therefore by contrast. It sounds dull as compared with Radiola's best, and its dynamic range can't compare with the best standards of today. The concerto is tuneful enough, and the performance sound, but it could not pace it with a modern version.

DELIUS—Brigg Fair, An English Rhapsody, On Hearing the First Cuckoo in Spring, The Walk to the Paradise Gardens, A Song of Summer. Played by the London Symphony Orchestra, conducted by Anthony Collins. Decca LXT 2788.

One of the best Delius recordings I have ever heard. Anthony Collins, who bears an almost amusing resemblance to Beecham, shows that he is a strong competitor with the famous man as the accepted Delius interpreter. Music like this requires the most sensitive musical approach and the finest orchestral control. This record has them all, and you will hear these well-known compositions in a near-perfect performance. Brigg Fair, and The Walk to the Paradise Gardens I thought particularly good.

The recording is likewise first-rate, and the pressing equally good. It isn't necessary to say more than this, plus my very strongest recommendation if you are looking for a Delius record for your collection.

MANUEL DE FALLA.—The Three Cornered Hat, ballet by Martinez Sierra. Played by L'Orchestre de L'Opera-Comique, Paris, conducted by Jean Martinon. Nixa ULP 9034.

Selections from this ballet are often played either as separate items or as grouped selections, but here is the music complete with the vocal contributions by Amparito Peris de Pruliere. More detailed program notes would have helped the listener to preserve his sense of continuity, but it is tuneful stuff and very easy to hear, as Spanish as Spain.

The performance would be admirable as ballet accompaniment, but for the listener it would have gained by a little more flamboyancy and drive. It is somewhat remote, but has a nice baance.

The recording is good if not brilliant, with a nice body and range. Surface noise is very low and for the most part inaudible.

JOE "FINGERS" CARR & HIS RAGTIME BAND—Eight numbers. Capitol CLP 020.

Eight popular numbers played in authentic ragtime by one of the best popular bands of the day. They include Sweet Georgia Brown, Wabash Blues, San Antonio Rose and Canadian Capers. Not only is the style good but the recording near-terrific. Capitol are particularly good at this kind of thing, and this pressing does them musical and mechanical credit.

THE STANDARD AMPLIFIER No. 1

(Continued from Page 77)

is no earthing of the AC circuit at the unit to set up "earth loops" and this form of construction renders the technique less important.

In actual fact, the switch can be wired on the bench and the appropriate connections made to the remainder of the circuit after the switch is fitted to the front panel.

Use ½-watt resistors throughout and, in the case of the switch, use the miniature capacitors now available. These are very little larger than the old size of ½-watt resistors and make the switch wiring easier still.

One of the 25 mfd capacitors fits between the switch and the bracket, while the other is at the end of the bracket as shown in the photographs.

The two 8-tag mounting strips, one on each side of the bracket, carry all incoming and outgoing leads as well as the junction of some of the components.

We mounted the socket of the 12AX7 so that the gap between pins 1 and 9 was toward the top edge of the front panel. Although this is not the only position for the socket, we do know that it allows a satisfactory arrangement of the components.

The lower tag mounting strip carries the output from the unit and the two 6.3-volt heater leads. The upper one carries the junction of the .05 mfd capacitor and the .33 megohm resistor, the junction of the .5 megohm, .1 megohm, .02 megohm, .025 megohm resistors and the 16 mfd capacitor, the earth connection of pin 2 of the 6-pin socket to the bracket, and the incoming high tension lead.

Keep the components wired between the socket and the mounting strips tucked close to the chassis, so that the 16 mfd capacitor, the last component to go into place, can sit as close to the bracket as possible to avoid fouling the 5-pin socket mounted in the cover.

The shielded lead from the pick-up is brought in through the cover toward one corner. Slip a length of spaghetti over the braid to avoid possible shorting when the cover is placed in position.

The connections between tag mounting strips and the sockets in the cover need only be long enough to allow easy connection with the cover just free.

In making up the interconnecting cable between the unit and the amplifier, don't forget to make the connection between pin 4 at each end in shielded wire. Because of the low impedance output, there is no need to use co-axial cable.