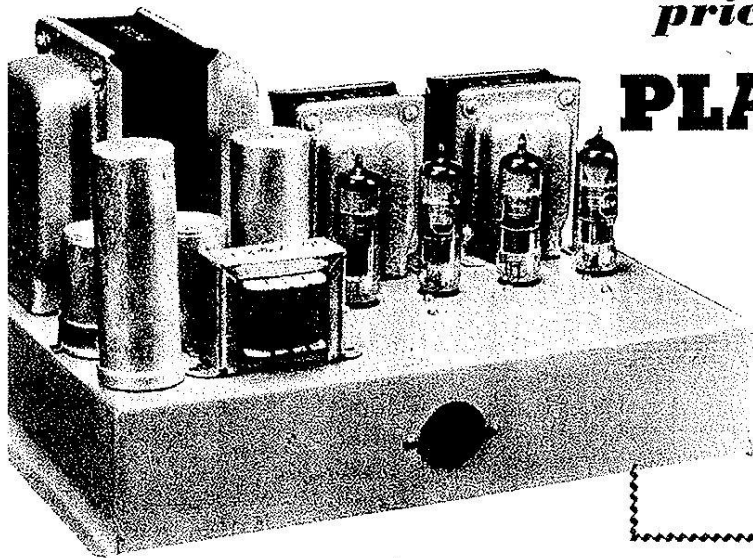


High performance at a budget price with our new

PLAYMASTER 101



This front view of the new Playmaster 101 Basic Amplifier shows the power equipment at the left and, to the right, the four 6W8 triode-pentodes in front of the respective output transformers. The octal socket on the front receives the cable from whatever Control Unit and Tuner the builder associates with the amplifier.

Using just four modern triode-pentode valves and a pair of newly released output transformers, we are able to present this high-powered, tra-linear stereo amplifier, with a considerable saving in cost over earlier and comparable designs. It may provide the basis you have been wanting for a new high-fidelity sound system.

by John Davidson and Neville Williams

JUST before looking in detail at the circuit, it may be a good plan to end a few paragraphs, by way of entention," for new readers.

Firstly, the name "Playmaster" is one we have used for many years in association with our build-it-yourself high-fidelity amplifier and allied projects. The name has become positively identified, in fact, with "Radio, Television and Hobbies" designs, while the equipment has earned an enviable reputation for reliability, performance and economy. Playmaster designs date back to October, 1951, as the brainchild of our editor, John Moyle. Since then, there has been a long procession of designs, too numerous to list, covering basic amplifiers, unit amplifiers, control units, and even, quite recently, a complete electronic organ!

NEW SERIES?

But the very number of these designs, and the way they inevitably reflect the passing years, is gradually creating confusion for readers, would-be constructors and parts dealers alike. There is no clear demarcation between what is "modern" and what is "obsolete," either in respect to individual units or their relationship to current types of pickup and loudspeaker.

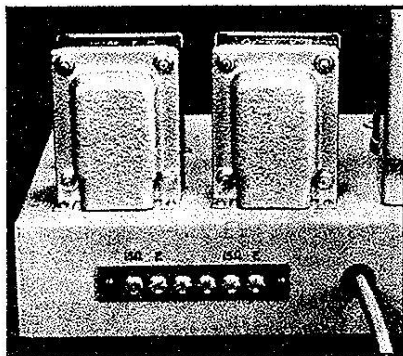
That brings us to the number "101," which has been allocated to this design. We want it to be the first of a new "one hundred" series of Playmaster designs, gradually to supersede those which have gone before. Ultimately, we want to be able to regard anything that is not in the "one hundred" series as obsolete and to be referred to only when there is a specific reason for so doing. But let there be no panic! In terms of input sensitivity, external connections, coupling, etc., this new amplifier is

completely compatible with the basic amplifiers of the recent past.

In fact, one of our tests was to check it as a direct "plug-in" replacement for the still current twin 10-watt stereo basic amplifier. It is designed to work directly with our current crystal and high-gain control units, and with the hybrid transistor/valve control unit referred to elsewhere in this issue.

In short, the new and distinctive number is the first step toward assisting readers—and ourselves—to distinguish the recent from the not-so-recent designs. Now for the term "basic amplifier."

One common technique is to build an amplifier as a completely self-contained unit; the pickup or microphone leads are connected at one point and leads from the loudspeaker(s) are connected to another. The entire amplifier circuitry, the power supply and even, in some cases, a radio tuner, are all assembled on the one chassis which is



At the rear of the chassis a screw-type 6-tag strip is provided for the loudspeaker leads. The terminals can carry the output impedances most likely to be required.

provided, in many cases, with a decorative metal cover and with an ornamental escutcheon behind the control knobs.

For the sake of a name, we generally refer to such designs as "unit amplifiers."

While unit amplifiers have their advantages, they can present difficulties with residual hum, particularly where they have to work with very low level magnetic pickups. Again, in some cabinet arrangements, it may be difficult to tolerate the bulk, weight and heat of a complete amplifier in the spot where commonsense dictates that the controls should be.

SEPARATE UNITS

Because of this, it has been a common alternative approach to accommodate the preamplifier circuitry and the various control knobs in a separate "control unit," connecting to the rest of the amplifier (including power supply) through a multi-wire cable.

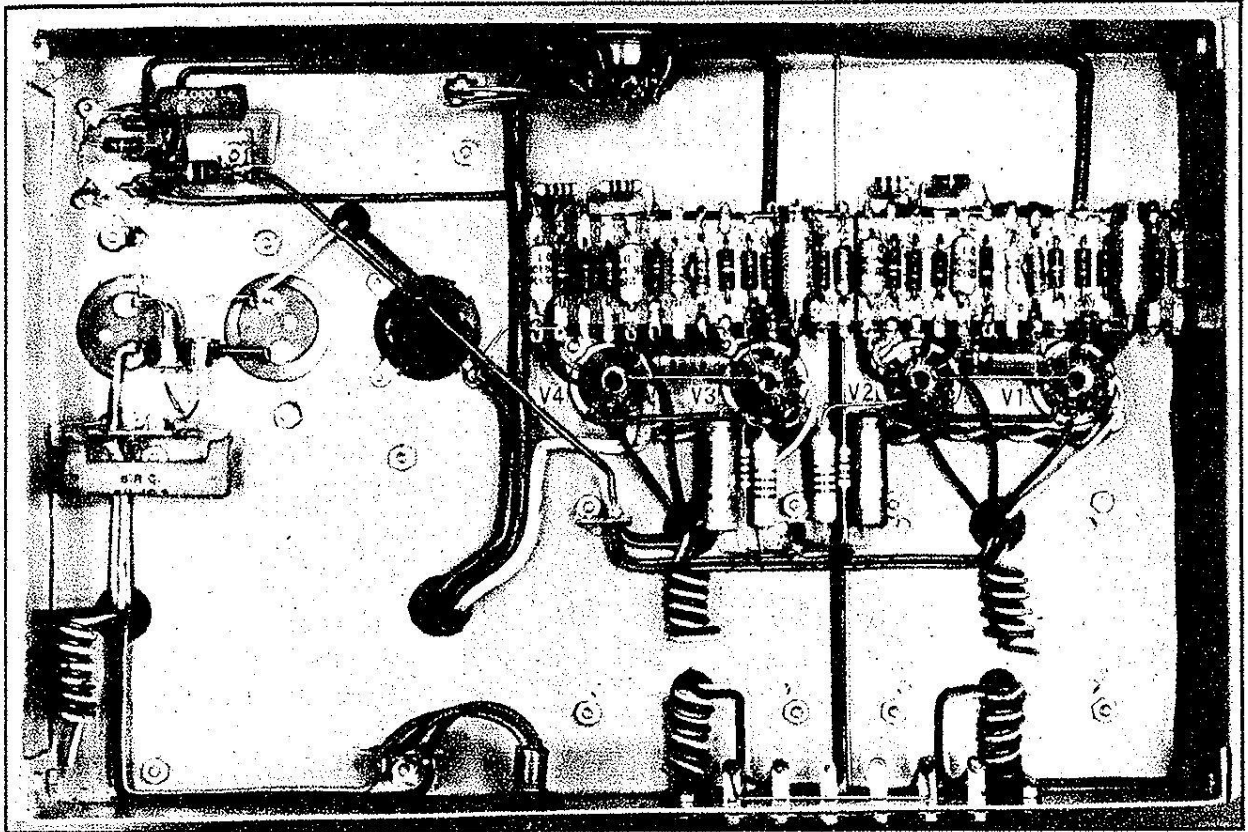
In our terminology, a "basic" amplifier is therefore one which has no control facilities of its own and which is designed to be tucked away, unseen, in the bottom of your record-playing cabinet. It needs to be connected to a control unit via a cable and the socket provided, and to a radio tuner, if you want such a facility.

If you plan to use a stereo crystal or ceramic pickup, the control unit to go with this basic amplifier would be the Playmaster No. 9 Control Unit, described in the July, 1959, issue.

If you plan to use a magnetic pickup, the appropriate control unit is the No. 10, described in the May, 1960, issue.

An alternative approach for magnetic pickups is the hybrid kind of arrangement referred to elsewhere in this issue, combining a transistor preamplifier with the No. 9 (crystal) Control Unit.

One final point, which you may note, is that all references to this point have assumed a stereo system. This is explained simply by the fact that high fidelity interest appears, these days, to be confined largely to stereo systems. New pickups, for example, are almost invariably stereo types; in the popular field, there are simply no mono radiograms.



Considering the performance, the amplifier is surprisingly uncomplicated under the chassis. Most of the wiring components are carried on the tagstrip, which has two identical sections, each serving one pair of 6GW8 valves. The unused transformer leads have simply been clipped so that the wire is well back inside the sleeve, then rolled up for neatness.

Therefore, while we have not "written off" mono "Playmasters," it is inevitable that our designs shall reflect the established demand.

So much then for the preamble. Maybe it has been rather lengthy but at least new readers will be in a better position to evaluate the present circuit.

Experience with typical Playmaster equipment over the years has confirmed our conviction that a twin 10-watt (or hereabouts) stereo system is probably the ideal choice for a discerning high fidelity enthusiast. Such an amplifier can generally avoid the problems of special valves, high voltages and high heat dissipation, while still having a liberal margin of output over all ordinary domestic requirements.

Typical of such amplifiers is the Playmaster 10-watt stereo amplifier in the January, 1959, issue and a somewhat modified version, with silicon rectifiers, in December of the same year. Both of these are excellent amplifiers and, in terms of performance, rank with any of the much higher priced, imported commercial amplifiers.

We can say this quite safely, because they use output transformers of extremely high quality and both employ the necessary stages to give the requisite gain, with a high order of overall negative feedback.

This new design does not supersede these earlier ones in terms of ultimate performance, though we doubt whether even the most discerning ear could pick the difference. It came into being simply because we asked and answered the question . . . can comparable performance be obtained for a smaller outlay?

An important contribution to economy

was the recent release of the 6GW8 valve — one which contains in the one envelope a high performance output pentode rather like the EL84/6BQ5, and a high-gain triode voltage amplifier.

Examination of the pentode ratings indicated that, for 300 volts of H.T., a pair of the valves could deliver better than 14 watts as pentodes and only slightly less in the ultralinear (or divided load connection). In this respect they are directly comparable with the EL84/

6BQ5 types specified in the earlier designs.

But could a satisfactory basic amplifier be devised using only the 6GW8s and the triode sections contained in the same envelopes?

More figuring revealed that it probably could. It looked as though, from the valve point of view, we could have a basic stereo amplifier with better than 10 watts output per channel, an input sensitivity of 200 millivolts, ultralinear

PARTS LIST

- 1 Chassis 12in x 8in x 2½in.
- 1 Power transformer, voltage doubler type, secondary 126 volts AC at 180mA DC. 6.3 volts c.t. 3A, 6.3 volts 4 A. (PVD109 or similar).
- 1 2.5 henry 200mA choke (see text).
- 2 Output transformers (see text).
- 4 Noval sockets.
- 1 Octal socket.
- 4 6GW8 valves.
- 2 Power diodes 1N1763, FST1/4, OA210, 1N2094 etc.

CAPACITORS

- 2 100 mfd 200VW electrolytics, one to be insulated.
- 1 100 mfd 350VW electrolytic.
- 1 3 x 50 mfd 300VW electrolytic.
- 2 50 mfd 25VW electrolytics.
- 2 10-25 mfd 3VW electrolytics.
- 4 .022 mfd 400 volt paper or plastic.
- 2 .0047 mfd 400 volt paper or plastic.
- 2 220 pF plastic or ceramic (not high K).
- 2 150 pF plastic or ceramic (not high K).

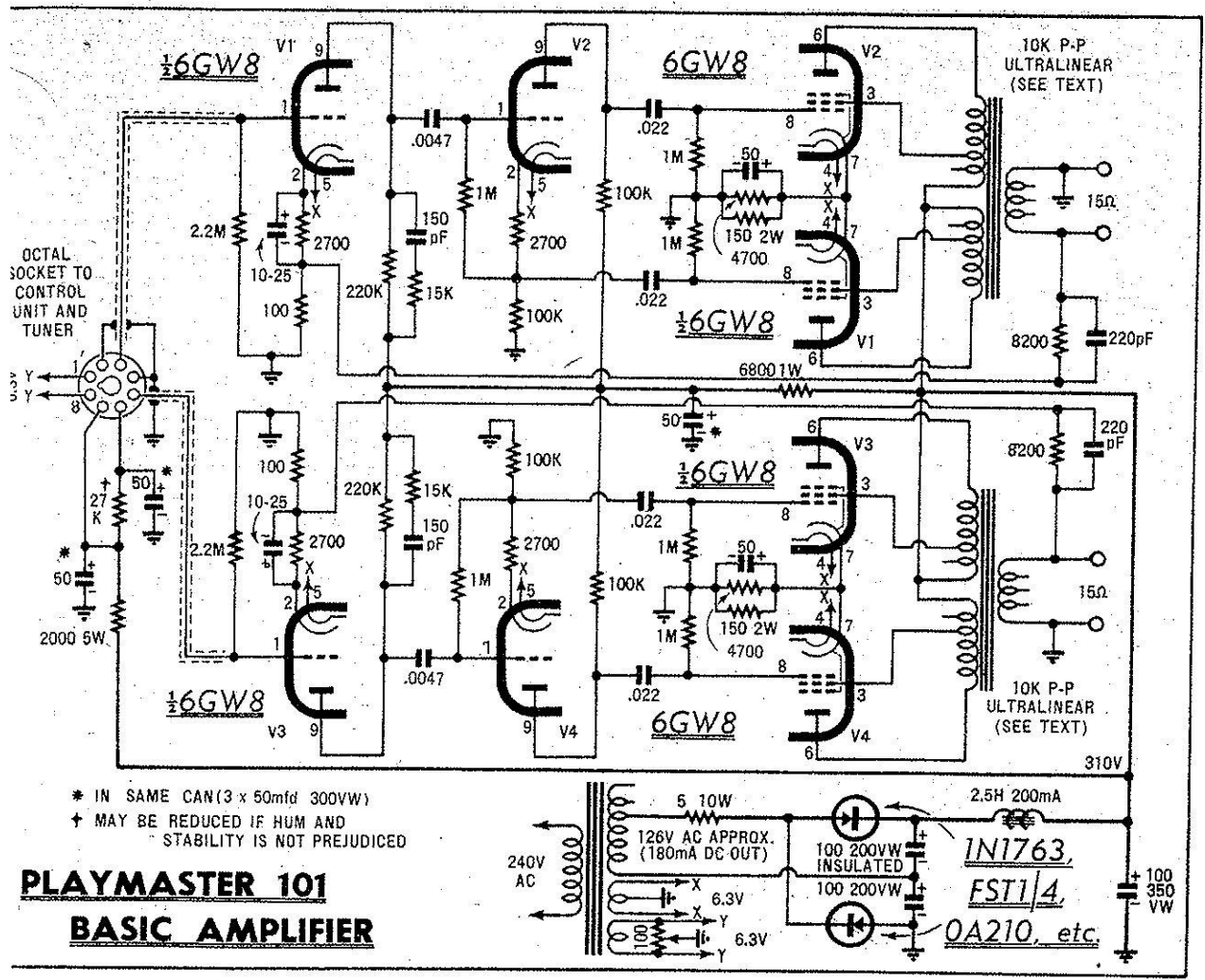
RESISTORS

(Half watt unless specified).

- 2 2.2 meg.
- 6 1 meg.
- 2 220K.
- 4 100K.
- 1 27K.
- 2 15K.
- 2 8200 ohm.
- 1 6800 ohm 1 watt.
- 2 4700 ohm.
- 4 2700 ohm.
- 1 2000 ohm 5 watt.
- 2 150 ohm 2-watt.
- 1 100 ohm pre-set slider type.
- 2 100 ohm.
- 1 5 ohm 10-watt.

SUNDRIES

- 1 6-screw terminal strip, 5 3/8in rubber grommets, 3 ½in rubber grommets, miniature resistor strip (Cinch or similar) 28 tags long, miniature tagstrip, 1 4-tag, 1 3-tag, 2 2-tag, tinned copper wire, shielded wire, hookup wire nuts, bolts, three core flex, power plug.



Although considerable savings have been effected in the basic amplifier circuit, we have retained a liberal margin the power supply rating, sufficient to operate a Control Unit and Tuner. The voltage to the supplementary units can be varied if necessary by altering the values of the decoupling resistors.

nected and with about 10 db of over-feedback.

very attractive proposition, indeed, saving three out of a total of seven valves.

Unfortunately, the transformer position didn't look quite as promising at first approach. There was not much to be gained in merely saving on valves while assuming the use of sophisticated—expensive—output transformers.

We wanted to go one better than the necessarily compact transformers used on our recent Unit-4 amplifier. However, requests for a 12- to 15-watt transformer, ultralinear and inexpensive, brought forth a recitation of the difficulties which such a proposition involved. Nor were we happy to compromise on a straight pentode connection in view of the limited amount of feedback which could be anticipated.

But, to cut a long story short, the design organisation came up with an answer which is virtually a reworked version of their existing OPM7 transformer—a conventional, sectionalised 2-pull job, with multi-tapped primary and secondary windings.

In the new version, designated as OPM7A, all leads are brought out, instead of the two halves of the primary being internally connected via a common wire.

For the purpose of this present circuit the outer and former 10,000-ohm plate leads join together to become the common B-plus; the former 7,000-ohm leads join to the screens, while the ends formerly commoned to B-plus now go to the plates. The unused tapings on both primary and secondary are shown on the circuit and are also evident in the underneath photograph.

This arrangement gives a 10,000-ohm plate-to-plate load with ultralinear taps at about 17 per cent—figures somewhat different from the valve makers' recommendations, but not significantly so, considering the nature of the loud-speaker load into which practical amplifiers have to work.

What was more to the point, preliminary costing on the proposed transformer showed that it could sell for probably less than half the price of the 15-watt super-fidelity type it would replace, and marginally less than the compact seven-watt unit mentioned earlier.

As it turned out, the performance of the amplifier with this transformer rather amazed us. At middle frequencies we measured better than 12 watts actual output from the secondary at 15 ohms before overload became visible on the C.R.O. screen.

At 10 watts output per channel the measured distortion at middle frequencies was only a fraction of one per

cent, diminishing as the output was lowered toward a more typical figure for home use.

Only at very low frequencies and at high output did the distortion tend to rise at all.

In terms of stability, at the feedback levels required, no problems were encountered beyond those normally associated with wide-range amplifiers employing overall feedback. Minor differences were apparent between different transformers, but the phase correcting components shown in the circuit should be suitable and representative for the type.

Measured at the one-watt level, which is about as much average power per channel as one would use in the home, the frequency response is only 1db down at 35cps, 2db at 25cps and 3db at 22cps.

At the top end, and depending on the exact constants of the feedback phrasing components, the amplifier is completely flat over the audible range, being still only 3db down at 40Kc.

The important point behind all this is that this transformer has shown what can be achieved. It would appear that other manufacturers have standing designs capable of similar modification so that, along with the 6GW8 valves, the way has been opened to important savings in the high quality field.

And, make no mistake, this is a high