

# Conversion of 1.4 Volt Superhet to Low Consumption Valves

by J. B. HALL

*Editor's Note.*—This short article describes a reader's experiences in converting a portable receiver from 50mA filament to 25mA filament valves, and the remarks apply to a receiver employing parallel-connected filaments running from a single 1.4 volt cell.

*The modifications should, on no account, be attempted on receivers in which the valve filaments are connected in series or in series-parallel because they may cause one or more filaments to burn out. Receivers which should not be modified are mains/battery types and receivers whose filament supply voltage is greater than that provided by a single 1.4 volt cell.*

THE SET IN QUESTION WAS A CONVENTIONAL superhet employing the line-up: 1R5, 1T4, 1S5 and 3S4. By using the "96" series valves, the existing set and components and a minor amount of work, a considerable saving on both h.t. and l.t. batteries was realised. The reading for l.t. before alteration was 1.4 volt 240mA.

A set of low consumption valves was ordered through one of the advertisers in *The Radio Constructor*, the cost being 35s. 9d., including postage. These valves are DK96, DF96, DAF96 and DL96.

Each stage was altered and checked with a meter separately, as some constructors for reasons of economy may wish to change one valve at a time. The greatest saving is made with the output stage. This was the 3S4 and the valve base requires slight modification to suit the DL96. Filament and anode connections remain unchanged but the connections to pins 3 and 6 are changed over. The l.t. current on completion of the modification to this stage was reduced to 200mA. Some adjustment to the value of the auto-bias resistor is required but more about this later.

Working backwards, the next stage was the diode and first a.f. 1S5. This was directly changed to the DAF96. The l.t. current was now 170mA.

The i.f. amplifier was also changed directly from 1T4 to DF96. L.T. now read 155mA<sup>1</sup>

Finally, the frequency-changer 1R5 was replaced by the DK96. This required alteration to the valve base wiring, pin 5

changing from chassis to h.t. positive.<sup>2</sup> Note that on some sets pin 5 is directly earthed to chassis and connection is made to the spigot and pin 1. Make certain such connections remain at chassis potential after the modifications. On completion of the modification, l.t. consumption was, as expected, 125mA, some 50% of the current drain when using the original valves.

Biasing the output valve calls for some comment. Usually the value of auto-bias resistor with a 3S4 is between 680 and 1,000Ω, and for the DL96 between 470 and 560Ω.

## Valve Equivalents

|      |   |      |   |      |   |       |
|------|---|------|---|------|---|-------|
| 3S4  | — | N17  | — | 1P10 | — | DL92  |
| 3V4  | — | N19  | — | 1P11 | — | DL94  |
| 1S5  | — | ZD17 | — | 1FD9 | — | DAF91 |
| 1T4  | — | W17  | — | 1F3  | — | DF91  |
| 1R5  | — | X17  | — | 1C1  | — | DK91  |
| 1AC6 | — | X18  | — | 1C2  | — | DK92  |
| 1AB6 | — |      | — | 1C3  | — | DK96  |
| 1AJ4 | — |      | — | 1F1  | — | DF96  |
| 1AH5 | — |      | — | 1FD1 | — | DAF96 |
| 1P1  | — |      | — | 3C4  | — | DL96  |

With the receiver finally modified and an auto-bias resistor of 560Ω, h.t. current consumption was 12mA at 70 volts. This was considered too high. It was found possible to increase the auto-bias resistor in this particular receiver to 1,500Ω without the onset of distortion. The total current consumption then became 6.5mA.

The above relates to changing the valve

<sup>1</sup> For a 90 volt h.t. supply the series screen-grid resistor (to pin 3 of the DF96) should have a value of 39kΩ or more. No screen-grid series resistor is necessary for operation from a 67.5 volt supply.

<sup>2</sup> Pin 5 of the DK96 should be connected directly to h.t. positive only when a 67.5 volt h.t. battery is employed. With a 90 volt h.t. battery a resistor of 120kΩ should be connected in series, and pin 5 bypassed to chassis via a 0.02μF condenser.

line-up 1R5, 1T4, 1S5 and 3S4. If the line-up DK92, DF91, DAF91 and DL94 is employed in the receiver, this may be changed to "96" series valves with no alteration other than that of changing the value of the auto-bias resistor.<sup>3</sup>

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<sup>3</sup> Provided that the points covered by footnotes 1 and 2 are observed.

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The final touch to the above set was the re-alignment of the i.f. transformers although, throughout the modifications, the local station came in at good volume.

The substitution in both the a.f. stages should require alteration of the anode loads but in actual practice no change was made and the valves operated quite normally with the existing loads.