ELECTRON TUBES

RCA Application Note

AN-135
June 15, 1948

Single-Section Filament Operation of Types 3S4 and 3V4

When it is desirable to minimize power consumption in a receiver or other equipment at the expense of power output, operation of types 3S4 and 3V4 utilizing only one section of the two-section filament is permissible. These types, designed for dry-battery operation, are power output tubes with two filament sections arranged so that they may be heated either in series with 2.8 volts and 50 milliamperes, or in parallel with 1.4 volts and 100 milliamperes. One filament section is connected between pins 1 and 5, and the other is connected between pins 5 and 7.

Tube operation utilizing one section heated with 1.4 volts and 50 milliamperes is permissible subject to the following recommendations:

1. Use only filament section between pins 5 and 7. Make no connection to pin 1.

2. Apply the filament voltage so that pin 7 is positive and pin 5 is negative.

3. Do not switch from single-filament operation to series or parallel filament operation, or from one filament section to the other.

Recommendations 1 and 2 are made primarily to insure consistency between testing results and tube operation. Recommendation 3 is made because prolonged operation of a tube with only one filament section utilized may result in deterioration of the other section. Subsequent use of the other section, therefore, would not give results predictable from initial ratings. Ratings, typical operating conditions, and characteristics for types 3V4 and 3S4 with single-section filament operation follow.

Filament Arrangement:

Pin 7 connected to filament (+); pin 5 connected to filament (-); pin 1, no external connection.

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Maximum Ratings:

	Type 3S4	Type 3V4*	
PLATE VOLTAGE	90 max.	90 max.	volts
GRID-No.2 (SCREEN) VOLTAGE	67.5 max.	90 max.	volts
TOTAL ZERO-SIGNAL CATHODE CURRENT. . .	4.5 max.	6 max.	ma
TOTAL MAXIMUM-SIGNAL CATHODE CURRENT .	5.5 max.	6 max.	ma

Typical Operation and Characteristics:

Filament Voltage	1.4	1.4	volts
Filament Current	0.050	0.050	amperes
Plate Voltage.	90	90	volts
Grid-No.2 Voltage.	67.5	90	volts
Grid-No.1 Voltage.	-7.0	-4.5	volts
Peak AF Grid-No.1 Voltage.	7.0	4.5	volts
Zero-Signal Plate Current.	3.7	4.8	ma
Zero-Signal Grid-No.2 Current.	0.7	1.1	ma
Plate Resistance (approx.)	0.2	0.2	megohm
Transconductance	800	1100	μmhos
Load Resistance	16000	20000	ohms
Total Harmonic Distortion.	12	7	per cent
Maximum-Signal Power Output.	135	135	mw

* Data for type 3V4 apply also to type 3Q4.

Comparison of characteristics given above with the published characteristics of type 3V4 and 3S4 for parallel-filament operation shows that (1) the plate and grid-No.2 currents, the transconductance, and the

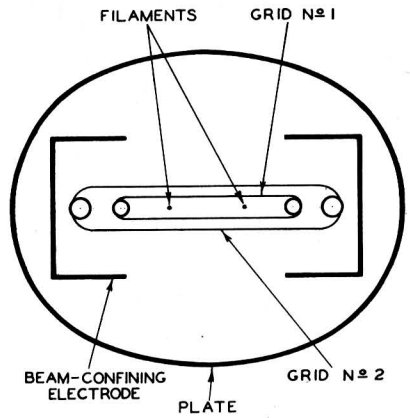

Fig. 1 - Cross-Sectional View of Tube Structure

power output have values approximately one-half of the values given for parallel-filament operation; and (2) the plate resistance and the recommended load resistance have values approximately twice those given for parallel-filament operation. These results indicate that the two

filament sections function almost independently in their contributions to the performance of these tube types.

Geometrical considerations also, support the theory that operation of the two filament sections of types 3S4 and 3V4 should be nearly independent. Fig. 1 shows a cross section, approximately to scale, of the structure of one of these tubes. Because the distance from either filament section to the closest point of grid No.1 is considerably less than half the distance between the two filament strands, the effect of the electric field of the space charge about one of the filament sections on the electric field in the vicinity of the other section is very small.