RCA Cunningham Radiotron RADIO TUBES

RCA-6F6

Power Amplifier Pentode

The 6F6 is a heater-cathode power-amplifier pentode of the metal type for use in the audio-output stage of a-c receivers. It is capable of giving large power output with a relatively small input voltage. Because of the heater-cathode construction, a uniformly low hum-level is attainable in power-amplifier design.

TENTATIVE CHARACTERISTICS

HEATER VOLTAGE (A.C. or D.C.)	6.3	Volts
HEATER CURRENT	0.7	Volts
MAXIMUM OVERALL LENGTH	3-1/4"	
MAXIMUM DIAMETER	1-5/16"	
BASE	Small Octal 7-Pin	

Single-Tube Class A Amplifier

	Pentode Connection		*Triode Connection* Screen tied to plate	
PLATE VOLTAGE	250	315 *max.*	250 *max.*	Volts
SCREEN VOLTAGE	250	315 *max.*	-	Volts
GRID VOLTAGE	-16.5	-22	-20	Volts
PLATE CURRENT	34	42	31	Milliamperes
SCREEN CURRENT	6.5	8	-	Milliamperes
PLATE RESISTANCE	80000°	75000°	2600	Ohms
AMPLIFICATION FACTOR	200°	200°	7	
MUTUAL CONDUCTANCE	2500	2650	2700	Micromhos
LOAD RESISTANCE	7000	7000	4000	Ohms
TOTAL HARMONIC DISTORTION	7	7	5	Per cent
POWER OUTPUT	3	5	0.85	Watts

Under the above maximum voltage conditions, transformer or impedance input-coupling devices are recommended. If resistance-coupling is used, refer to last paragraph of APPLICATION.

° Approximate.

Push-Pull Class AB Amplifier (Pentode Connection)

	Fixed-Bias	*Self-Bias*	
PLATE VOLTAGE	375 *max.*	375 *max.*	Volts
SCREEN VOLTAGE	250 *max.*	250 *max.*	Volts
GRID VOLTAGE	-26 *min.*	-	Volts
SELF-BIAS RESISTOR	-	340 *min.*	Ohms
ZERO-SIGNAL PLATE CUR. (Per tube)	17	27	Milliamperes
ZERO-SIGNAL SCREEN CUR. (Per tube)	2.5	4	Milliamperes
LOAD RESISTANCE (Per tube)	2500	2500	Ohms
EFFECTIVE LOAD RESISTANCE (Plate-to-plate)	10000	10000	Ohms
TOTAL HARMONIC DISTORTION	5	5	Per cent
POWER OUTPUT (2 tubes)	19 *approx.**	19 *approx.*	Watts

Under the above maximum voltage conditions, transformer or impedance input-coupling devices must be used.

* With one triode-connected 6F6 as driver operated at plate volts of 250, grid volts of -20, and with a minimum plate load of approximately 10000 ohms: input transformer ratio, primary to one-half secondary, is 3.32. The plate, screen and grid supply have negligible resistance.

With one triode-connected 6F6 as driver operated at plate volts of 250, grid volts of -20, and with a minimum plate load of approximately 10000 ohms: input transformer ratio, primary to one-half secondary, is 2.5. The plate and screen supply have negligible resistance. The value given for the self-bias resistor is determined for a minimum grid bias of -21 volts.

Push-Pull Class AB Amplifier (Triode Connection)

	Screen tied to plate		
	Fixed-Bias	*Self-Bias*	
PLATE VOLTAGE	350 *max.*	350 *max.*	Volts
GRID VOLTAGE	-38	-	Volts
SELF-BIAS RESISTOR	-	730 *min.*	Ohms
ZERO-SIGNAL PLATE CURRENT (Per tube)	22.5	25	Milliamperes
LOAD RESISTANCE (Per tube)	1500	2500	Ohms
EFFECTIVE LOAD RESISTANCE (Plate-to-plate)	6000	10000	Ohms
TOTAL HARMONIC DISTORTION	7	7	Per cent
POWER OUTPUT (2 tubes)	18 *approx.*°	14 *approx.*•	Watts

Under the above maximum voltage conditions, transformer or impedance input-coupling devices must be used.

° With one triode-connected 6F6 as driver operated at plate volts of 250, grid volts of -20, and with a minimum plate load of approximately 10000 ohms: input transformer ratio, primary to one-half secondary, is 1.67. The plate and grid supply have negligible resistance.

• With one triode-connected 6F6 as driver operated at plate volts of 250, grid volts of -20, and with a minimum plate load of approximately 10000 ohms: input transformer ratio, primary to one-half secondary, is 1.29. The plate supply has negligible resistance. The value given for the self-bias resistor is determined for a minimum grid bias of -36.5 volts.

INSTALLATION

The *base* pins of the 6F6 fit the seven-contact octal-base socket (or the universal eight-contact socket) which may be installed to hold the tube in any position.

The *heater* is designed to operate at 6.3 volts. The transformer supplying this voltage should be designed to operate the heater at this recommended value for full-load operating conditions at average line voltage.

The *cathode* should preferably be connected directly to a mid-tap on the heater winding or to a center-tapped resistor across the heater winding. If this practice is not followed, the potential difference between heater and cathode should be kept as low as possible.

APPLICATION

As a *Class A power-amplifier pentode*, the 6F6 may be used either singly or in push-pull. Recommended operating conditions are given

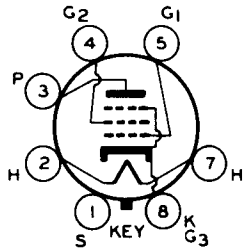
under CHARACTERISTICS. If a single 6F6 is operated at a plate voltage of 250 volts, the self-bias resistor should have a value of approximately 410 ohms; at 315 volts, 440 ohms. For two tubes in the same stage, the value of the self-bias resistor should be approximately one-half that for a single tube.

As a *Class A power-amplifier triode*, the 6F6 may be used either singly or in push-pull. For this service the screen is connected to the plate. Recommended operating conditions are given under CHARACTERISTICS. If a single 6F6 is operated as a Class A triode at a plate voltage of 250 volts, the self-bias resistor should have a value of approximately 650 ohms. For two tubes in the same stage, the value of the self-bias resistor should be approximately one-half that for a single stage.

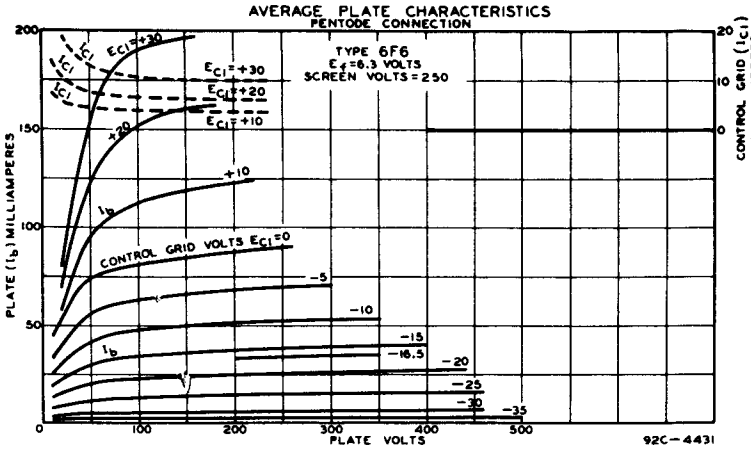
As a *Class AB power-amplifier triode or pentode*, the 6F6 should be operated as shown under the CHARACTERISTICS. The values shown cover operation with fixed-bias and with self-bias, and have been determined on the basis of some grid-current flow during the most positive swing of the input signal and of cancellation of second-harmonic distortion by virtue of the push-pull circuit.

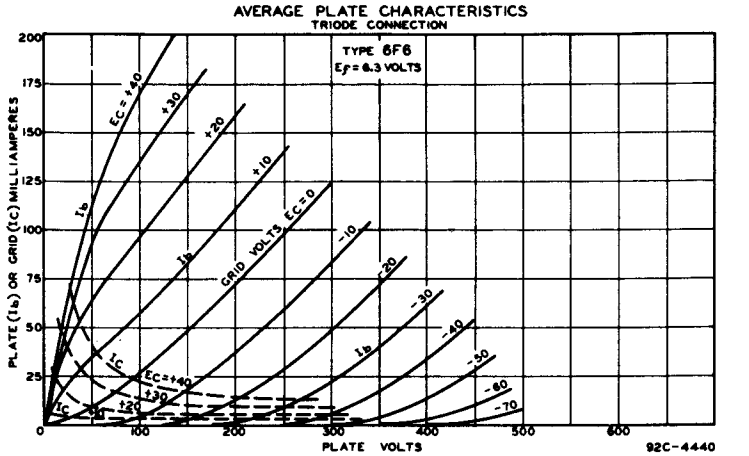
Self-bias resistors should be shunted by a filter network to avoid degeneration at the low audio-frequencies. The filter network may be omitted for push-pull Class A pentode and Class A triode service.

The type of input coupling used should not introduce too much resistance in the grid circuit. Transformer- or impedance-coupling devices are recommended. When the grid circuit has a resistance not higher than 0.05 megohm, fixed bias may be used; for higher values, self-bias is required. With self-bias, the grid circuit may have a resistance as high as, but not greater than, 0.5 megohm provided the heater voltage is not allowed to rise more than 10% above rated value under any condition of operation.



BOTTOM VIEW


AVERAGE PLATE CHARACTERISTICS
PENTODE CONNECTION
TYPE 6F6
Ef=6.3 VOLTS
SCREEN VOLTS=250
PLATE (Ib) MILLIAMPERES
CONTROL GRID (Ic1) MILLIAMPERES
PLATE VOLTS
CONTROL GRID VOLTS Ec1=0
92C-4431


AVERAGE PLATE CHARACTERISTICS
TRIODE CONNECTION
TYPE 6F6
Ef=6.3 VOLTS
PLATE (Ib) OR GRID (Ic) MILLIAMPERES
PLATE VOLTS
GRID VOLTS Ec=0
92C-4440