



Sylvania TYPE 42 POWER AMPLIFIER



CHARACTERISTICS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.7 Ampere
Bulb	ST-14
Base—Medium 6-Pin	6-B
Mounting Position	Any

Ratings: (For interpretations see Page 12.)

	Pentode	Triode*
Heater Voltage AC or DC	6.3	6.3 Volts
Heater Current	0.7	0.7 Ampere
Plate Voltage	375	350 Volts Max.
Screen Voltage	285	... Volts Max.
Plate Dissipation	11	10 Watts Max.
Screen Dissipation	3.75	... Watts Max.

Operating Conditions and Characteristics:

SINGLE TUBE CLASS A1 AMPLIFIER

	Pentode		Triode*
Heater Voltage	6.3	6.3	6.3 Volts
Plate Voltage	250	285	285 Volts
Screen Voltage	250	285	... Volts
Grid Voltage	-16.5	-20	-20 Volts
Peak A-F Signal Voltage	16.5	20	20 Volts
Plate Current (Zero Signal)	34	38	31 Ma.
Plate Current (Max. Signal)	36	40	34 Ma.
Screen Current (Zero Signal)	6.5	7	... Ma.
Screen Current (Max. Signal)	10.5	13	... Ma.
Plate Resistance (Approx.)	8000	7800	2600 Ohms
Mutual Conductance	2500	2550	2600 μ mhos
Amplification Factor	6.8
Load Resistance	7000	7000	4000 Ohms
Power Output	3.2	4.8	.85 Watts
Total Harmonic Distortion	8	9	6.5 Per Cent

PUSH-PULL AMPLIFIER

	Class A1 Pentode	Class AB2 Pentode Triode*	
Heater Voltage	6.3	6.3	6.3 Volts
Plate Voltage	315	375	350 Volts
Screen Voltage	285	250	... Volts
Grid Voltage	-24	-26	-38 Volts
Peak A-F Grid to Grid Voltage	48	82	123 Volts
Plate Current (Zero Signal)	62	34	48 Ma.
Plate Current (Max. Signal)	80	82	92 Ma.
Screen Current (Zero Signal)	12	5	... Ma.
Screen Current (Max. Signal)	19.5	19.5	... Ma.
Load Resistance (Plate to Plate)	10000	10000	6000 Ohms
Power Output	11	18.5	13 Watts
Total Harmonic Distortion	4	3.5	2 Per Cent

*With screen grid tied to plate.

CIRCUIT APPLICATION

Sylvania Type 42 is a cathode type power output pentode equipped with a 6.3 volt heater. This tube cannot be used to replace the 47 in receivers already built because it employs a 6.3 volt heater and also requires a six prong socket. Its characteristics are somewhat similar to those of the 47 except that the possible power output has been considerably increased.

The use of Type 42 as an output tube will greatly reduce the hum usually present in the average receiver employing filament type pentodes.

When operated into the optimum load with 250 volts plate and 16.5 volts grid bias and supplied with a peak signal equal to the

(Continued on following page)

TYPE 42—Continued

grid bias, Type 42 is capable of delivering more than three watts of power with minimum second harmonic.

Type 42 may be employed in the output stage, resistance coupled from either the detector tube or the first audio stage if diode detection is used. If resistance coupling is used, the grid resistor must not exceed 500,000 ohms in value. This value should be employed only when the tube is operated entirely self-biased. If the tube is operated with a fixed bias or partially so, the resistor should not exceed 250,000 ohms.

The recommended load resistance should be used if possible in order to keep the second harmonic at a minimum. If, however, the tubes are used in push-pull Class A, somewhat lower third harmonic in the output may be obtained by employing a lower load for both tubes than normal since the second harmonics will cancel in push-pull.

An important application for Type 42, and one which has been extensively adopted, is the use of this tube as a triode. The mutual conductance, plate resistance and amplification factor of Type 42 as a triode (i.e., the screen tied directly to the plate) make the tube ideally suited for use in Class AB circuits utilizing one Type 42 as a driver and two tubes in the output stage. In addition to having satisfactory characteristics, the tube has the advantage of being an indirectly heated cathode type, which permits the use of a special compensated bias circuit, described below, without requiring additional filament windings on the power supply transformer.

One of the most serious difficulties encountered in Class AB operation is that of maintaining a bias voltage of sufficient constancy to obtain the maximum power output of the tubes with low percentage distortion content. This is due to the fact that the output tubes are normally over-biased, and if automatic bias is used a substantial rise in bias voltage occurs due to the increase in plate current resulting from the applied signal on the grids. This difficulty can be compensated for to a large extent by under-biasing the driver tube while the output tubes are normally over-biased. The cathodes of all three tubes should have a common biasing resistor. The bias for the driver is taken across a portion of this resistance so that any change in total plate current of the three tubes makes a corresponding change in the bias voltages. When a signal is applied the current in the output tubes tends to increase, resulting in an increased drop across the cathode resistor which produces a larger bias on the driver stage as well as on the output tubes. This increase in negative grid voltage causes a drop in the cathode current of the first tube which offsets, to some extent, the current increase of the output tubes. Hence, the net result is a change in the bias on the output stage which is far less than that which would normally take place for straight Class AB operation in which no compensating arrangement is incorporated.

In order that there be a minimum of distortion at high output levels, it is essential that the optimum biasing conditions be attained for this type of service. Such a system has the distinct advantage of approaching Class A operation for low power outputs, there being an almost negligible amount of distortion present, under recommended operating conditions, below 10 watts; furthermore, it is possible to obtain 15 watts before the total harmonic content exceeds 5 per cent.

For either triode or pentode push-pull Class AB amplifier service, operated under the maximum voltage conditions as specified on the rating sheets, transformer or impedance input-coupling devices must be used.

The driver stage should be carefully designed in order to realize maximum output with minimum distortion. In each of the four arrangements listed the recommended driver tube is a single Type 42, triode connected. It should be operated under the following conditions:

Plate Voltage	250 Volts
Grid Voltage	-20 Volts
Minimum Plate Load	10000 Ohms

The plate, screen and grid voltage supplies should have negligible resistance.