



Sylvania

TYPE 78

TRIPLE GRID

SUPER-CONTROL

AMPLIFIER

CHARACTERISTICS

Heater Voltage AC or DC	6.3 Volts
Heater Current	0.3 Ampere

Direct Interelectrode Capacitances:

Grid to Plate (with tube shield)	0.007 $\mu\mu\text{f}$ Max.
Input	4.5 $\mu\mu\text{f}$
Output	11.0 $\mu\mu\text{f}$
Maximum Over-all Length	4 $\frac{1}{2}$ "
Maximum Diameter	1 $\frac{1}{16}$ "
Bulb	ST-12
Cap	Small Metal
Base—Small 6-Pin	6-F

Operating Conditions and Characteristics:

AMPLIFIER (CLASS A)

Heater Voltage	6.3	6.3	6.3	6.3	Volts
Plate Voltage	90	180	250	250	Volts Max.
Grid Voltage	-3	-3	-3	-3	Volts Min.
Screen Voltage	90	75	100	125	Volts Max.
Suppressor	Connected to Cathode at socket				
Plate Current	5.4	4.0	7.0	10.5	Ma.
Screen Current	1.3	1.0	1.7	2.6	Ma.
Plate Resistance	0.315	1.0	0.8	0.6	Megohm
Mutual Conductance	1275	1100	1450	1650	μmhos
Amplification Factor	400	1100	1160	990	
Grid Voltage*	-38.5	-32.5	-42.5	-52.5	Volts

*Grid voltage for mutual conductance of 2 μmhos .

MIXER TUBE

(Superheterodyne Circuits)

Heater Voltage	6.3 Volts
Plate Voltage	250 Volts Max.
Screen Voltage	100 Volts
Grid Voltage	-10 Volts
Suppressor	Tied to Cathode

CIRCUIT APPLICATION

Sylvania 78 is a triple grid super-control amplifier designed to fulfill the many requirements imposed on a tube for service in radio frequency and intermediate frequency stages of AC, DC and automobile receivers.

In physical appearance the 78 is similar to Type 77. The three grids terminate at separate base pins; the bulb, base, top cap, and cage are identical, although the latter is tied internally to the cathode whereas in the 77 it connects to the screen. The heaters have the same rating.

Electrically they perform in a very different manner, for the 77 has a sharp cut-off while Type 78 has been designed to have a remote cut-off characteristic.

Radio Frequency Amplifier:

It is in this service that the 78 is most useful and the super-control feature utilized to advantage. Cross-talk and cross-modulation result whenever strong signals are impressed on r-f amplifier tubes, with the tube operating on a non-linear portion of its characteristic. This action may exist when the grid bias has been increased in order to reduce the volume. A Type 78 is capable of reducing such effects due to the design of the control grid, enabling the tube to handle large signals satisfactorily.

(Continued)

To utilize the control features of this tube to full advantage, the screen should be maintained at a constant potential with respect to the cathode, together with a variable negative bias for the grid which may be obtained either from the a-v-c system or by manual control.

The highest practical plate circuit load should be used with the 78. For i-f amplifiers at a fixed frequency a tuned impedance load will be found satisfactory and a gain of 200 per stage can be realized. Where uniform sensitivity is necessary over a wide band of frequencies, the type of coupling will be governed by the specific requirements. If a grid coupling resistor is required, its value should not exceed 1.0 megohm.

Modulator or First Detector:

The use of a 78 as the first detector in superheterodyne circuits will provide a gain of approximately one-third of that possible in an i-f amplifier stage when the proper conditions of grid and local oscillator voltage exist. The gain can be controlled by variation of the d-c grid bias which may be from a separate supply or from a variable resistor in the cathode circuit.

In conjunction with automatic volume control, this feature permits reception at a much lower threshold input without a decrease in amplification. Furthermore, it makes possible the reception of high input voltages without loss of control. Additional control is often useful in improving volume control characteristics where a limited number of tubes are available in the circuit on which control can be used.

When the first detector is self-biased the oscillator voltage may be made nearly equal to the grid bias at maximum sensitivity, because the applied signal under such conditions will be small. Nevertheless, to insure that the first detector will not draw grid current, thereby loading the input circuit, it is advisable to limit the peak oscillator voltage to a value about one volt less than the grid bias.

When variable bias is not used on the first detector, the peak oscillator voltage must be maintained at a somewhat lower value. This means a sacrifice in sensitivity. If used, it should be less than the grid bias by an amount equal to the largest peak signal to be received plus the peak value of any probable interference voltage.

Tube Shields:

The 78 is designed with an internal cage-like shield which is very effective in making the grid-plate capacity small. This inherent property of the tube makes it possible to reduce the amount of external shielding required in order to secure a low capacitance between grid and plate. In some instances the tube may function satisfactorily without external shielding.

In high gain stages a tube shield may be used to advantage in reducing the coupling between input and output circuits. The style employed should conform to that type which will give capacitances best suited to the circuit requirements.