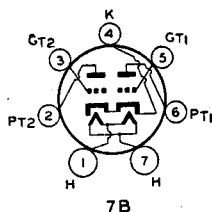


CLASS B TWIN AMPLIFIER

6A6

The 6A6 is a heater-cathode type of tube combining in one bulb two high-mu triodes designed for class B operation. The triode units have separate terminals for all electrodes except heater and cathode, so that circuit design is similar to that of class B amplifiers using two tubes. The 6A6 (with

the two units in parallel) may also be used as a class A₁ amplifier to drive a 6A6 as class B amplifier. Electrical characteristics of the 6A6 are the same as those of Type 6N7. The base of the 6A6 fits the medium seven-contact (0.855-inch, pin-circle diameter) socket which may be mounted to hold the tube in any position. Physical characteristics of the 6A6 are shown in Fig. 2-25, OUTLINES SECTION. For heater operation and application, refer to Type 6N7 and to RESISTANCE-COUPLED AMPLIFIER CHART.

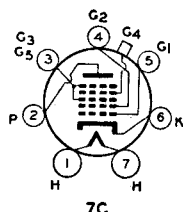


PENTAGRID CONVERTER

6A7

The 6A7 is a multi-electrode type of vacuum tube designed to perform simultaneously the functions of a mixer tube and of an oscillator tube in superheterodyne circuits. For discussion of pentagrid types, see Frequency Conversion under RADIO TUBE APPLICATIONS. Except for capacitances, which are given below, the electrical

characteristics of the 6A7 are identical with those of the 6A8.



DIRECT INTERELECTRODE CAPACITANCES:

Grid No. 4 to Plate (With shield-can)	0.3	μf
Grid No. 4 to Grid No. 2 (With shield-can)	0.15	μf
Grid No. 4 to Grid No. 1 (With shield-can)	0.15	μf
Grid No. 1 to Grid No. 2	1.0	μf
Grid No. 4 to All Other Electrodes (R-F Input) ...	8.5	μf
Grid No. 2 to All Other Electrodes (Osc. Output) ..	5.5	μf
Grid No. 1 to All Other Electrodes (Osc. Input) ...	7.0	μf
Plate to All Other Electrodes (Mixer Output)	9.0	μf

INSTALLATION and APPLICATION

The base of the 6A7 fits the seven-contact (0.75-inch pin-circle diameter) socket which may be installed to hold the tube in any position. Physical characteristics of the 6A7 are shown in Fig. 2-16, OUTLINES SECTION. For heater and cathode operation, refer to Type 6A8. Complete shielding of the 6A7 is generally necessary to prevent intercoupling between its circuit and the circuits of other stages. Application of this type is similar to that of Type 6A8. A typical circuit is shown under Type 6A8.

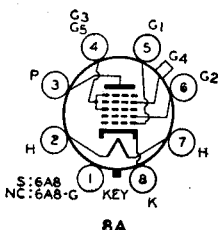
PENTAGRID CONVERTER

6A8

METAL

6A8-G

The 6A8 and 6A8-G are multi-electrode vacuum tubes. Each type is designed to perform simultaneously the functions of a mixer (first detector) tube and of an oscillator tube in superheterodyne circuits. Through the use of either type, the independent control of each function is made possible within a single tube. For general discussion of



pentagrid types, refer to Frequency Conversion under RADIO TUBE APPLICATIONS.

★ CHARACTERISTICS

HEATER VOLTAGE (A.C. or D.C.)	6.3	Volts
HEATER CURRENT	0.3	Ampere

Type 6A8 Type 6A8-G

DIRECT INTERELECTRODE CAPACITANCES:*

Grid No. 4 to Plate	0.03	0.26	$\mu\mu\text{f}$
Grid No. 4 to Grid No. 2	0.1	0.19	$\mu\mu\text{f}$
Grid No. 4 to Grid No. 1	0.09	0.16	$\mu\mu\text{f}$
Grid No. 1 to Grid No. 2	0.8	1.1	$\mu\mu\text{f}$
Grid No. 4 to All Other Electrodes (R-F Input)	12.5	9.5	$\mu\mu\text{f}$
Grid No. 2 to All Other Electrodes Except Grid No. 1 (Osc. Output)	5.0	4.6	$\mu\mu\text{f}$
Grid No. 1 to All Other Electrodes Except Grid No. 2 (Osc. Input)	6.5	6	$\mu\mu\text{f}$
Plate to All Other Electrodes (Mixer Output)	12.5	12	$\mu\mu\text{f}$

* With shell of 6A8 connected to cathode, and with close-fitting shield on 6A8-G connected to cathode.

As Frequency Converter

PLATE VOLTAGE	300 max.	Volts
SCREEN VOLTAGE (Grids No. 3 and No. 5)	100 max.	Volts
SCREEN SUPPLY VOLTAGE	300 max.	Volts
ANODE-GRID VOLTAGE (Grid No. 2)	200 max.	Volts
ANODE-GRID SUPPLY VOLTAGE	300 max.	Volts
CONTROL-GRID VOLTAGE (Grid No. 4)	0 min.	Volts
PLATE DISSIPATION	1.0 max.	Watt
SCREEN DISSIPATION	0.3 max.	Watt
ANODE-GRID DISSIPATION	0.75 max.	Watt
TOTAL CATHODE CURRENT	14 max.	Milliamperes

TYPICAL OPERATION:

Plate Voltage	100	250	Volts
Screen Voltage	50	100	Volts
Anode-Grid Voltage	100	250**	Volts
Control-Grid Voltage	-1.5	-3	Volts
Oscillator-Grid Resistor (Grid No. 1)	50000	50000	Ohms
Plate Current	1.1	3.5	Milliamperes
Screen Current	1.3	2.7	Milliamperes
Anode-Grid Current	2	4	Milliamperes
Oscillator-Grid Current	0.25	0.4	Milliampere
Total Cathode Current	4.6	10.6	Milliamperes
Plate Resistance (Approx.)	0.6	0.36	Megohm
Conversion Transconductance	360	550	Micromhos
Conversion Transconductance (Approx.) ..	3†	6††	Micromhos

† With control-grid bias of -20 volts

†† With control-grid bias of -35 volts.

** Anode-grid supply voltage applied through a properly by-passed 20000-ohm voltage-dropping resistor.

INSTALLATION and APPLICATION

The base of either the 6A8 or the 6A8-G fits the standard octal socket which may be employed to hold the tube in any position. Physical characteristics of the 6A8 and the 6A8-G are shown in Figs. 1-5, and 2-15, respectively, in the OUT-LINES SECTION.

The heater of the 6A8 or the 6A8-G is designed to operate on either a.c. or d.c. When either type is operated on a.c. with a transformer, the winding which supplies the heater circuit should operate the heater at its recommended value for full-load operating conditions at average line voltage. For service in automobile receivers, these types should have their heater terminals connected directly across a 6-volt battery. In receivers that employ a series-heater connection, the heater of either the 6A8 or 6A8-G may be operated in series with the heaters of other types having a 0.3-ampere rating. The current in the heater circuit should be adjusted to 0.3 ampere for an average line voltage of 117 volts.

The cathode of the 6A8 and of the 6A8-G when either type is operated from a transformer, should preferably be connected directly to the electrical mid-point of the heater circuit. When either type is operated in receivers employing a 6-volt storage battery for the heater supply, the cathode circuit is tied in either directly or through bias resistors to the negative side of the d-c plate supply which is furnished either by the d-c power line or the a-c line through a rectifier. In circuits where the cathode is not directly connected to the heater, the potential difference between them should be kept as low as possible. If the use of a large resistor is necessary between the heater and cathode in some circuit designs, it should be by-passed by a suitable filter network or objectionable hum may develop.

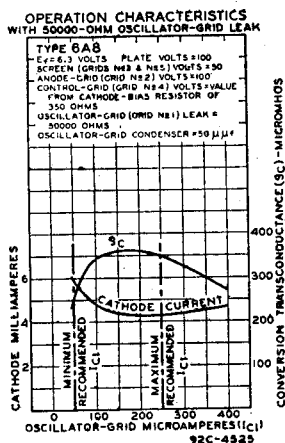
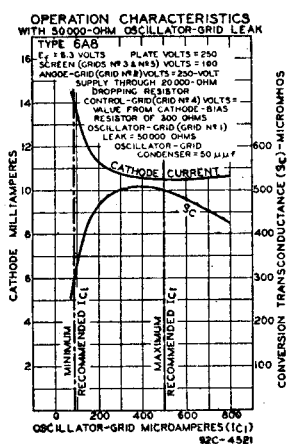
As a frequency converter in superheterodyne circuits, the 6A8 or the 6A8-G can supply the local oscillator frequency and at the same time mix it with radio-input frequency to provide the desired intermediate frequency. For this service, design information is given under CHARACTERISTICS.

For the oscillator circuit, the coils may be constructed according to conventional design, since neither tube type is particularly critical. The supply voltage applied to the anode-grid No. 2 should not exceed the maximum value of 300 volts. In fact, from a performance standpoint, a lower value is to be preferred, because it will be adequate to provide for optimum translation gain. Under no condition of adjustment should the cathode current exceed a recommended maximum value of 14 milliamperes.

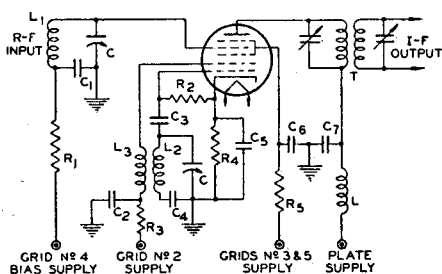
The bias voltage applied to grid No. 4 can be varied from zero to cut-off to control the translation gain of either type. With lower screen voltages, the cut-off point is less remote. The extended cut-off feature of the 6A8 and the 6A8-G in combination with the similar characteristic of super-control tubes can be utilized advantageously to adjust receiver sensitivity.

Typical coil data and circuit are shown below. When the 6A8 is used in this circuit, its shell should be connected to ground. Complete shielding of the 6A8-G is generally necessary to prevent intercoupling between its circuits and the circuits of other stages.

Since the capacitance between grid No. 4 and plate is in a parallel path with the capacitance and the inductance of the plate load, it is important to use a load capacitance of sufficient size to limit the magnitude of the r-f voltage built up across the load. If this is not done, r-f voltage feed-back will occur between plate and grid No. 4 to produce degenerative effects. For this reason, the size of the load condenser in the plate circuit should not be less than 50 $\mu\mu\text{f}$.



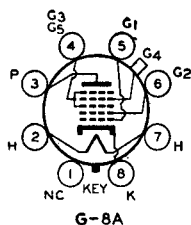
TYPICAL PENTAGRID CONVERTER CIRCUIT



C = GANGED TUNING CONDENSER
(40 TO 350 μf)
 $C_1, C_2, C_3, C_4, C_5, C_6, C_7 = 0.1 \mu\text{f}$
 $C_3 = 0.00025 \mu\text{f}$
 $C_4 = \text{SEE TABLE BELOW}$
 $R_1 = 250,000 \text{ OHMS}, 0.1 \text{ WATT}$
 $R_2 = 10,000 - 50,000 \text{ OHMS}, 0.1 \text{ WATT}$
 $R_3 = \text{OSCILLATOR-ANODE (GRID \#2)}$
 $R_4 = 150 - 300 \text{ OHMS}, 0.1 \text{ WATT}$
 $R_5 = \text{SCREEN (GRIDS \#3 \& 5) FILTER RESISTOR}$
 $L = 60\text{-MILLIHENRY R-F CHOKE}$
 $T = 465\text{-KC I-F TRANSFORMER}$

COIL-DESIGN DETAILS

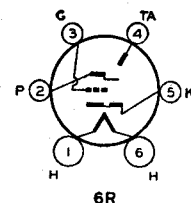
FREQUENCY BAND MEGACYCLES	0.15 TO 0.40	0.55 TO 1.5	1.5 TO 4.0	4.0 TO 10	10 TO 25
ASSEMBLY N ^o	1	1	2	3	3
TURN WIRE #	TURN WIRE #	TURN WIRE #	TURN WIRE #	TURN WIRE #	TURN WIRE #
R-F COIL (L ₁)	422 36 SSE	116 30 SSE	146 32 ENAM	36.2 30 ENAM	10.1 30 ENAM
OSC. GRID COIL (L ₂)	198 36 SSE	80 30 SSE	92 32 ENAM	30.9 30 ENAM	9.7 30 ENAM
OSC. PLATE COIL (L ₃)	60 36 SSE	30 30 SSE	20 32 ENAM	12 30 ENAM	12 36 ENAM
OSC. TRACKING COND (C ₄)	117 μf	400 μf	1070 μf	2900 μf	7300 μf
N^o 1 MULTI-LAYER COILS GRID N^o 1 CATHODE B+ GRID N^o 2 N^o 2 SINGLE-LAYER COILS GRID N^o 1 CATHODE GRID N^o 2 N^o 3 SINGLE-LAYER COILS GRID N^o 1 CATHODE B+ GRID N^o 2					



PENTAGRID CONVERTER

The 6A8-GT is a multi-electrode tube designed to perform simultaneously the functions of mixer tube and of oscillator tube in superheterodyne circuits. For general discussion of pentagrid converters, see Frequency Conversion under RADIO TUBE APPLICATIONS. Physical characteristics of the 6A8-GT are shown in Fig. 2-6, OUTLINES SECTION. Maximum Ratings and Typical Operation for the 6A8-GT are the same as for the 6A8.

6A8-GT



ELECTRON-RAY TUBE

6AB5/6N5 is the new designation for the electron-ray tube 6N5. See type 6N5 for further data. Physical characteristics of the 6AB5/6N5 are shown in Fig. 2-18, OUTLINES SECTION.

6AB5/6N5