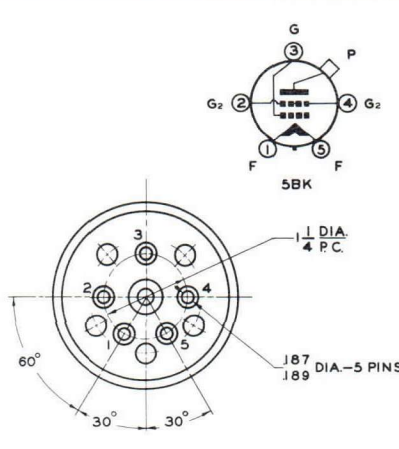
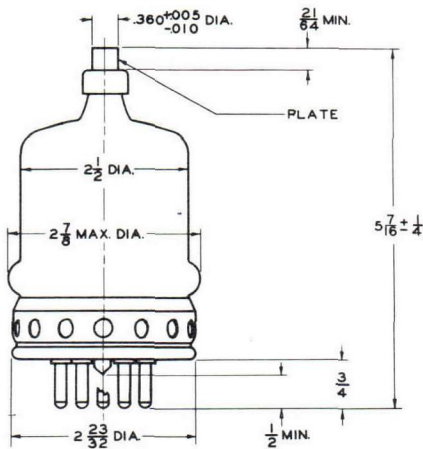




PL-4D21

Power Tetrode



The Penta PL-4D21 is a power tetrode with a maximum plate dissipation rating of 125 watts. Cooling for normal operation with a radiator-type plate connector is by radiation and by convective air flow through the base and alongside the envelope. Forced cooling of the envelope and the radiator-type connector by a small fan or blower is required for normal operation on frequencies above 30 Mc. and for operation under maximum ICAS ratings at all frequencies. Forced cooling of the seals at the base is required when free circulation of air through the base is prevented by shielding or other obstruction.

ELECTRICAL CHARACTERISTICS

Filament -- Thoriated Tungsten	
Voltage (± 5 per cent) - - - - -	5.0 volts
Current - - - - -	6.5 amperes
Grid-Screen mu factor - - - - -	5.9
Transconductance (2500 v. E_b , 400 v. E_{c2} , 50 ma. I_b) - - - -	2500 μ mhos
Interelectrode Capacitances	
Grid-plate - - - - -	0.05 μ f.
Input - - - - -	10.8 μ f.
Output - - - - -	3.1 μ f.
Maximum Frequency for Full Ratings - - - - -	120 Mc.

MECHANICAL CHARACTERISTICS

Base ¹ - - - - -	5-pin, metal shell
Basing - - - - -	EIA type 5BK
Maximum Overall Dimensions	
Length - - - - -	5.69 inches
Diameter - - - - -	2.82 inches
Net Weight - - - - -	6.5 ounces
Mounting Position - - - - -	Vertical, base up or down

¹ Recommended socket -- E.F. Johnson No. 122-275.



PENTA LABORATORIES, INC.

312 NORTH NOPAL STREET • SANTA BARBARA, CALIFORNIA



PL-4D21

OPERATION

The PL-4D21 is especially suited for use as a radio-frequency power amplifier. The compact construction and low interelectrode capacities permit operation at full ratings for continuous service at frequencies as high as 120 Mc. Operation at reduced ratings may be attained at frequencies as high as 240 Mc. The PL-4D21 may also be used as an audio-frequency power amplifier and modulator.

Under normal operating conditions the PL-4D21 requires an unusually small amount of driving power for a specified value of plate power output. The high power sensitivity of the tube permits a reduction in the power re-

quirements imposed upon the preceding driver stage, but requires that adequate precautions be taken to minimize the feedback of energy from the output circuit back to the input circuit of the tube.

Maximum ratings and typical operating conditions are given for ICAS (Intermittent Commercial and Amateur Service) operation in addition to the standard CCS (Continuous Commercial Service) ratings. ICAS ratings and operating conditions may be used for those classes of intermittent service on frequencies below 30 Mc. where the number of plate-power hours is materially less than the hours of filament operation.

MAXIMUM RATINGS—CCS (Continuous Commercial Service)

Frequencies up to 120 Mc.	Class C FM or C.W.	Plate Mod. Class C	Class AB ₁ Audio Ampl.	Class AB ₂ Audio Ampl.
D-C Plate Volts	3000	2500	3000	3000 volts
D-C Screen Volts	400	400	600	400 volts
D-C Grid Bias	—500	—500		volts
D-C Plate Current	225	200	225	225 ma.
Plate Dissipation	125	85	125	125 watts
Screen Dissipation	20	20	20	20 watts
Grid Dissipation	5	5		watts

MAXIMUM RATINGS—ICAS (Intermittent Commercial and Amateur Service)

Frequencies up to 30 Mc.	Class C FM or C.W.	Plate Mod. Class C	Class AB ₂ Audio Ampl.
D-C Plate Voltage	4000	3200	3200 volts
D-C Screen Voltage	400	400	400 volts
D-C Grid Bias	—500	—500	volts
D-C Plate Current	225	200	250 ma.
Plate Dissipation	125	100	125 watts
Screen Dissipation	20	20	20 watts
Grid Dissipation	5	5	watts



TYPICAL OPERATION—Class C C-W or FM Amplifier

	CCS—Frequencies below 120 Mc.			ICAS—Below 30 Mc.
D-C Plate Voltage	2000	2500	3000	4000 volts
D-C Screen Voltage	350	350	350	350 volts
D-C Grid Voltage	-100	-150	-150	-350 volts
D-C Plate Current	200	200	167	156 ma.
D-C Screen Current	50	40	30	16 ma.
D-C Grid Current	12	12	9	8 ma.
Plate Dissipation	125	125	125	125 watts
Screen Dissipation	18	14	10.5	5.6 watts
Grid Dissipation	1.6	2.0	1.2	1.0 watts
Peak R-F Grid Voltage (Approx.)	230	320	280	480 volts
Driving Power (Approx.)	2.8	3.8	2.5	3.8 watts
Plate Power Input	400	500	500	625 watts
Plate Power Output	275	375	375	500 watts

TYPICAL OPERATION—Class C Amplitude-Modulated Amplifier, Carrier Conditions

	CCS—Frequencies below 120 Mc.		ICAS—Below 30 Mc.
D-C Plate Voltage	2000	2500	3200 volts
D-C Screen Voltage	350	350	350 volts
D-C Grid Voltage	-220	-210	-335 volts
D-C Plate Current	150	152	156 ma.
D-C Screen Current	33	30	21 ma.
D-C Grid Current	10	9	8.5 ma.
Plate Dissipation	75	80	100 watts
Screen Dissipation	11.5	10.5	7.5 watts
Grid Dissipation	1.6	1.4	1.1 watts
Peak A-F Screen Voltage	210	210	240 volts
Peak R-F Grid Voltage (Approx.)	375	360	465 volts
Driving Power (Approx.)	3.8	3.3	4.0 watts
Plate Power Input	300	380	500 watts
Plate Power Output	225	300	400 watts

TYPICAL OPERATION—Class AB₁ A-F Power Amplifier or Modulator (Sine wave, two tubes)

D-C Plate Voltage	1500	2000	2500 volts
D-C Screen Voltage	600	600	600 volts
D-C Grid Voltage	-90	-94	-96 volts
Zero-Sig. D-C Plate Current	60	50	50 ma.
Max.-Sig. D-C Plate Current	222	240	232 ma.
Zero-Sig. D-C Screen Current	-1.0	-0.5	-0.3 ma.
Max.-Sig. D-C Screen Current	17	6.4	8.5 ma.
Plate-to-Plate Load Resistance	10,200	13,400	20,300 ohms
Peak A-F Grid-to-Grid Signal	180	188	192 volts
Driving Power	0	0	0 watts
Max.-Sig. Plate Diss. (per tube)	87.5	125	125 watts
Max.-Sig. Plate Power Output	158	230	330 watts
Total Harmonic Distortion	5	2	2.6 per cent

TYPICAL OPERATION—Class AB₂ A-F Power Amplifier or Modulator (Sine wave, two tubes)

	CCS			ICAS
D-C Plate Voltage	1500	2000	2500	3000* volts
D-C Screen Voltage	350	350	350	350 volts
D-C Grid Voltage	-41	-45	-43	-50 volts
Zero-Sig. D-C Plate Current	87	72	93	61 ma.
Max.-Sig. D-C Plate Current	400	300	260	280 ma.
Zero-Sig. D-C Screen Current	0	0	0	0 ma.
Max.-Sig. D-C Screen Current	34	14	16	9 ma.
Plate-to-Plate Load Resistance	7200	13,600	22,200	22,700 ohms
Peak A-f Grid-to-Grid Signal	282	210	178	188 volts
Average Driving Power (Max. Sig.)	2.5	1.4	1.0	0.85 watts
Peak Driving Power (Max. Sig.)	5.2	3.1	2.4	1.8 watts
Max.-Sig. Plate Diss. (per tube)	125	125	122	148* watts
Max.-Sig. Plate Power Output	350	350	400	550 watts
Total Harmonic Distortion	2.5	1.0	2.2	2.6 pct.

*Note—This set of operating conditions is for voice work of an intermittent nature and cannot be used at full signal for testing with a sine wave. In any event, average plate dissipation with normal voice modulation must not exceed 125 watts per tube.



PL-4D21

