

Grid No. 1 to all other electrodes except cathode	2.7	$\mu\mu\text{F.}$
Grid No. 1 to cathode	2.8	$\mu\mu\text{F.}$
Cathode to all other electrodes ex- cept grid No. 1	15	$\mu\mu\text{F.}$

Mechanical:

Mounting Position	Any
Maximum Overall Length	2 $\frac{1}{2}$ "
Maximum Seated Length	1 $\frac{7}{8}$ "
Length from Base Seat to Bulb Top (excluding tip)	1 $\frac{1}{2}$ " \pm 3/32"
Maximum Diameter	$\frac{3}{4}$ "
Bulb	T-5- $\frac{1}{2}$
Base	Miniature button 7-pin
Basing designation	7CH
Pin 1—Grid No. 1	
Pin 2—Cathode, grid No. 5.	
Pin 3—Heater	
Pin 4—Heater	
Pin 5—Plate	
Pin 6—Grid No. 2, grid No. 4	
Pin 7—Grid No. 3	

CONVERTER.**Maximum ratings, design-centre values:**

Plate voltage	300	max. volts
Grids—No. 2 and No. 4 voltage	100	max. volts
Grids—No. 2 and No. 4 supply voltage	300	max. volts
Plate dissipation	1.0	max. watt
Grids—No. 2 and No. 4 dissipation	1.0	max. watt
Total cathode current	14	max. mA.
Grid—No. 3 voltage:		
Negative Bias value	50	max volts
Positive Bias value	0	max. volts
Peak heater—Cathode voltage:		
Heater negative with respect to cathode	90	max. volts
Heater positive with respect to cathode	90	max. volts
Characteristics—Separate excitation:*		
Plate Voltage	100	250 volts
Grids—No. 2 and No. 4 (screen) voltage	100	100 volts
Grid—No. 3 (control grid) voltage	-1.5	-1.5 volts
Grid—No. 1 (Oscillator grid) resistor	20000	20000 ohms
Plate resistance (approx.)	0.5	1.0 megohm
Conversion transconductance	455	475 μmhos
Conversion transconductance (approx.)†	4	4 μmhos
Plate current	2.8	3.0 mA.
Grids—No. 2 & No. 4 current	7.3	7.1 mA.
Grid—No. 1 current	0.5	0.5 mA.
Total cathode current	10.6	10.6 mA.

NOTE: The transconductance between grid No. 1 and grids No. 2, and No. 4 connected to plate (not oscillating) is approximately 7250 micromhos under the following conditions: grids No. 1 and No. 3 at 0 volts; grids No. 2 and No. 4 and plate at 100 volts. Under the same conditions, the plate current is 25 milliamperes, and the amplification factor is 20.

* The characteristics shown with separate excitation correspond very closely with those obtained in a self-excited oscillator circuit operating with zero bias.

† With grid—No. 3 bias of -30 volts.

○ With no external shield.

Radiotron 8D21

Push-Pull Power Tetrode

Water and Forced-Air Cooled

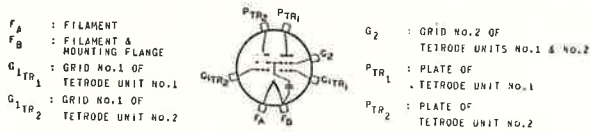
Radiotron type 8D21 is a water- and forced-air-cooled, high-power, twin tetrode of unique design intended for use as a class C, grid-modulated, r-f power amplifier in television transmitters. In such service, it has a maximum plate-voltage rating of 6000 volts, a maximum total plate input of 10,000 watts, and a maximum total plate dissipation of 6000 watts. It may be operated with maximum rated input up to 300 megacycles.

The 8D21 is unique in that high-power capability at very-high-frequency has been obtained by the use of a compact, high-current-density structure in which all electrodes are water cooled close to the active electrode areas.



RADIOTRON 8D21 (Continued)

For Terminal Connections, See Outline Drawing



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The structure features a thoria-coated, multi-strand filament; low interelectrode capacitances; excellent internal shielding between input and output circuits; internal neutralization of the small feedback capacitance to eliminate need for external neutralization internal by-passing of screen to filament to maintain the r-f potential of the screen at ground potential; and relatively short internal leads with consequent low inductances. The over-all length of the 8D21 is only about 12 inches and its maximum diameter is 5 3/4 inches.

Because of electron optical principles incorporated in its design, the 8D21 has high power sensitivity and thus its driving-power requirements are low.

GENERAL DATA

Electrical:

Filament, Thoria Coated:		
Voltage (ac. or d.c.)	4.2	Volts
Current	135	Amperes
Starting Current: Must never exceed 220 amperes, even momentarily.		
Grid-Screen Mu-Factor (each Unit)	5	
Direct Interelectrode Capacitances (each Unit):*		
Grid No. 1 to Plate	0.15	μμF.
Input	24	μμF.
Output	6	μμF.
Grid—No. 2 By-Pass Capacitor (Internal)	approx. 200	μμF.

Mechanical:

Mounting Position: Plane of grid No. 1 leads horizontal and below horizontal plane of plate leads
 Maximum Overall Length 12.9/32"
 Maximum Diameter 5 3/4"
 Terminal Connections See Outline Drawing

Cooling: An air flow of at least 40 c.f./m should be directed at the glass end of the valve so as to cool the area between the plate seals as well as the sides of the glass envelope.

Water cooling of the filament block, the No. 1 grids, the No. 2 grids, and the plates is required. The water flow must start before application of any voltages and preferably should continue for several seconds after removal of all voltages. Interlocking of the water flow with all power supplies is recommended to prevent valve damage in case of failure of adequate water flow. A minimum water flow should be provided as follows for the:

Filament	0.2 min. gals./min.
Grid No. 1 of Each Unit	0.2 min. gals./min.

Grid No. 2	0.2 min. gals./min.
Plate of Each Unit	0.6 min. gals./min.
Water Pressure
} 60 min. lbs./sq. in.	
} 100 min. lbs./sq. in.	
Outlet Water Temperature	70 max. °C.
Bulb and Seal Temperatures	150 max. °C.

Grid-Modulated Push-Pull
 R-F Power Amplifier—Class C.

Unless otherwise specified, values are for both units.

Maximum Ratings, Absolute Values:

	CCS°	
D.C. Plate Voltage	6000 max.	Volts
D.C. Grid—No. 2 (screen) voltage	1000 max.	Volts
D.C. Grid—No. 1 (Control Grid) voltage	-1000 max.	Volts
D.C. Plate Current	2 max.	Amperes
Plate Input	10000 max.	Watts
Grid—No. 2 Input	400 max.	Watts
Plate Dissipation	6000 max.	Watts
Grid—No. 1 Dissipation	50 max.	Watts

Typical Operation in Television Service up to 216 Mc/s.:

D.C. Plate Voltage	5000	Volts
D.C. Grid—No. 2 Voltage	800	Volts
D.C. Grid—No. 1 Voltage:		
Synchronizing Level	-220	Volts
Black Level	-385	Volts
White Level	-875	Volts
Peak R-F Grid—No. 1 to Grid—No. 1 Voltage	1300	Volts
D.C. Plate Current:		
Synchronizing Level	1.8	Amperes
Black Level	1.35	Amperes
D.C. Grid—No. 2 Current:		
Black Level	-0.025	Ampere
D.C. Grid—No. 1 Current:		
Synchronizing Level	0.050	Ampere
Black Level	0.010	Ampere
Driving Power (approx.)**	5	Watts
Band Width	6	Mc/c.
Power Output:		
Synchronizing Level	5400	Watts
Black Level	3200	Watts

o Continuous Commercial Service.

* With no external shielding. Grid No. 1-to-plate capacitance is internally neutralized by the valve structure.

** In practical, wide-band circuit design with swamping resistors, a driving power of about 500 watts is required to take care of the losses in the swamping resistors, the circuit losses, and the valve driving power.

TERMINAL CONNECTIONS

The two plate terminals are taken to the top of the valve. The two Grid No. 1 terminals, with their water inlet and outlet connections, are close together at the bottom right-hand corner of the photograph; the other connections at the lower end include the screen and filament, each with its own water inlet and outlet.