12DS7

TWIN DIODE--POWER TETRODE

9-Pin Miniature Type

For Use in "Hybrid" Automobile Receivers Operating Directly From 12-Volt Storage Batteries

TENTATIVE DATA

RCA-12DS7 is a multiunit tube of the 9-pin miniature type containing two diodes and a high-perveance power tetrode of the space-charge-grid type in one envelope. It is intended for use in "hybrid" automobile receivers in which tube and transistor electrode voltages are obtained directly from a 12-volt storage battery. In such receivers, the diode units are used for am signal detection and automatic volume control, while the tetrode unit serves as the driver for the transistorized af power output stage.

Because of its high perveance, the tetrode unit can supply high space-charge grid current and high plate current with only 12.6 volts on the plate. These features, in addition to a high value of grid-No.2-to-plate transconductance (15000 micromhos) and a low value of plate resistance of only 480 ohms, enable this tube to supply high input power at low distortion to the transistor in the power output stage of automobile receivers.

Space-charge-grid operation of the tetrode unit is accomplished by operating grid No.1 at a positive potential and utilizing grid No.2 as the control electrode.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage range (AC or DC)	10.0 to 15.9	volts
This voltage range is on an absolute basis. For longest life, it is recommended that the heater be operated within the voltage range of 11 to 14 volts.		
Current (Approx.) at 12.6 volts	0.4	amp
Direct Interelectrode Capacitances (Without external shield):		
Tetrode Unit:		
Grid No.2 to plate	12.5	μμf
Grid No.2 to grid No.1, heater, and cathode	13	μμf
Plate to grid No.1, heater, and cathode	2	μμf
Diode Units:		
Diode plate No.1 to diode cathode and heater	0.5	μμf
Diode plate No.2 to diode cathode and heater	0.5	μμf
Diode plate No.1 to diode plate No.2	0.1	μμf
Tetrode grid No.2 to diode plate No.1	0.15 max.	μμf
Tetrode grid No.2 to diode plate No.2	0.15 max.	μμf

Characteristics, Class A_1 Amplifier with 12.6 Volts on Heater:

Plate Voltage	12.6	volts
Grid-No.2 (Control-Grid) Voltage:		
Developed across a 2.2-megohm resistor	-0.5	volt
Grid-No.1 (Space-Charge-Grid) Voltage	12.6	volts
Plate Resistance (Approx.)	480	ohms
Amplification Factor, grid No.2 to plate	7.2	
Transconductance, grid No.2 to plate	15000	μmhos
Plate Current	40	ma
Grid-No.1 Current	75	ma

Mechanical:

Operating Position	Any
Maximum Overall Length	2-5/8"
Maximum Seated Length	2-3/8"
Length, Base Seat to Bulb Top (Excluding tip)	2" ± 3/32"
Diameter:	
Minimum	0.750"
Maximum	0.875"
Bulb	T-6-1/2
Base	Small-Button Noval 9-pin (JETEC No.E9-1)

TETRODE UNIT — AUDIO DRIVER SERVICE

Maximum Ratings, *Design-Center Values Except as Noted:*

PLATE VOLTAGE	16 max.	volts
GRID-No.2 (CONTROL-GRID) VOLTAGE:		
Negative bias value	-16 max.	volts
GRID-No.1 (SPACE-CHARGE-GRID) VOLTAGE (Absolute Maximum)	16 max.	volts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Typical Operation:

With 12.6 volts on heater and grid-No.2 voltage obtained by a cathode resistor

Plate Supply Voltage	12.6	volts
Plate Voltage	Obtained from indicated plate supply through series 100-henry choke having dc resistance of 150 ohms	
Grid-No.1 Supply Voltage	12.6	volts
Grid-No.2 Supply Voltage	0	volts
Grid-No.2 Resistor	1.8	megohms
Cathode Resistor	18	ohms
Peak AF Grid-No.2 Supply Voltage (Approx.):		
From 3.3-megohm signal source	2.85	volts
Plate Current:		
Zero Signal (Approx.)	23	ma
Maximum Signal	13	ma
Grid-No.1 Current	77	ma
Load Resistance	1250	ohms
Total Harmonic Distortion	8	per cent
Max.-Signal Power Output	10	mw

ELECTRON TUBE DIVISION
RADIO CORPORATION OF AMERICA, HARRISON, NEW JERSEY

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Typical Operation:

With 12.6 volts on heater and grid-No.2 voltage obtained by a grid-No.2 resistor

Plate Voltage	12.6	volts
Grid-No.1 Voltage	12.6	volts
Grid-No.2 Voltage:		
Obtained by rectification through a 2.2-megohm resistor	-2	volts
Peak AF Grid-No.2 Voltage (Approx.):		
From 0.1-megohm signal source	2.5	volts
Plate Current:		
Zero Signal (Approx.)	40	ma
Maximum Signal	8	ma
Grid-No.1 Current	75	ma
Load Resistance	800	ohms
Total Harmonic Distortion	10	per cent
Max.-Signal Power Output	40	mw

Maximum Circuit Values:

Grid-No.2 Circuit Resistance	10 max.	megohms

DIODE UNITS -- Two

Values are for Each Unit

Maximum Ratings, *Design-Center Values:*

PLATE CURRENT	5 max.	ma
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	16 max.	volts
Heater positive with respect to cathode	16 max.	volts

Characteristics with 12.6 Volts on Heater:

Plate Current for plate volts = 10	3	ma

OPERATING CONSIDERATIONS

The *maximum ratings* in the tabulated data, except the rating for grid-No.1 voltage, are established in accordance with the following definition of the *Design-Center Rating System* for rating electron devices.

Design-Center ratings are limiting values of operating and environmental conditions applicable to a bogey electron device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

The device manufacturer chooses those values to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply voltage variation*, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in device characteristics.

The equipment manufacturer should design so that initially no design-center value for the intended service is exceeded with a bogey device in equipment operating at the stated normal supply voltage.*

The *maximum rating* shown in the tabulated data for grid-No.1 voltage is established in accordance with the following definition of the *Absolute-Maximum Rating System* for rating electron tubes.

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

The device manufacturer chooses these values to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environment variations, and the effects of changes in operating conditions due to variations in device characteristics.

The equipment manufacturer should design so that initially and throughout life no absolute maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in device characteristics.

* For automotive equipment utilizing a 12-volt system, battery voltage range of 10.0 volts to 15.9 volts is accepted U.S.A. practice.

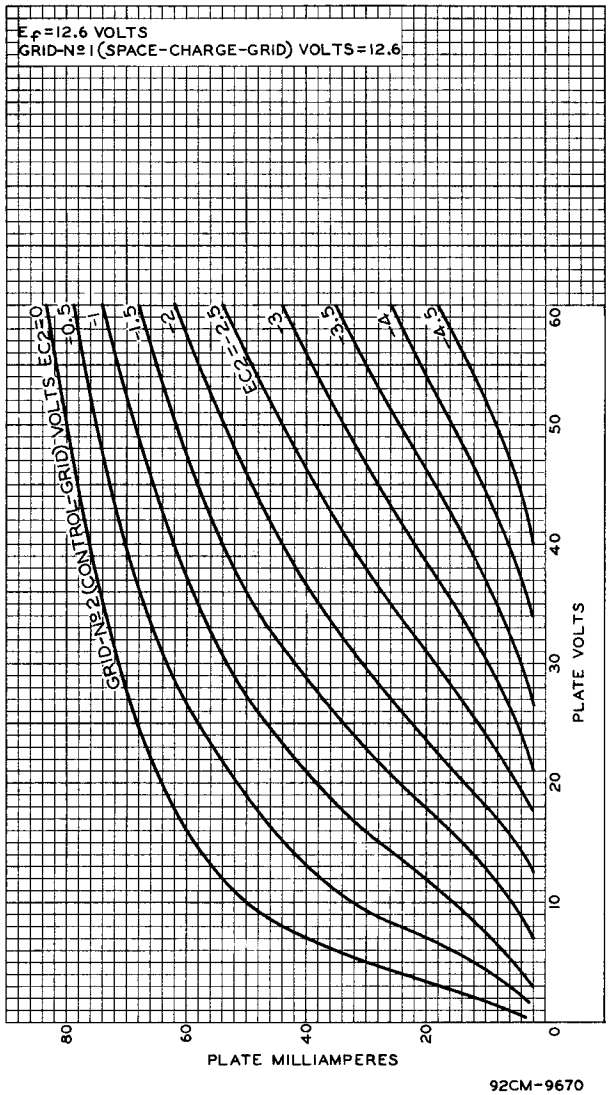


Fig. 1 - Average Plate Characteristics for Tetrode Unit of Type 12DS7.

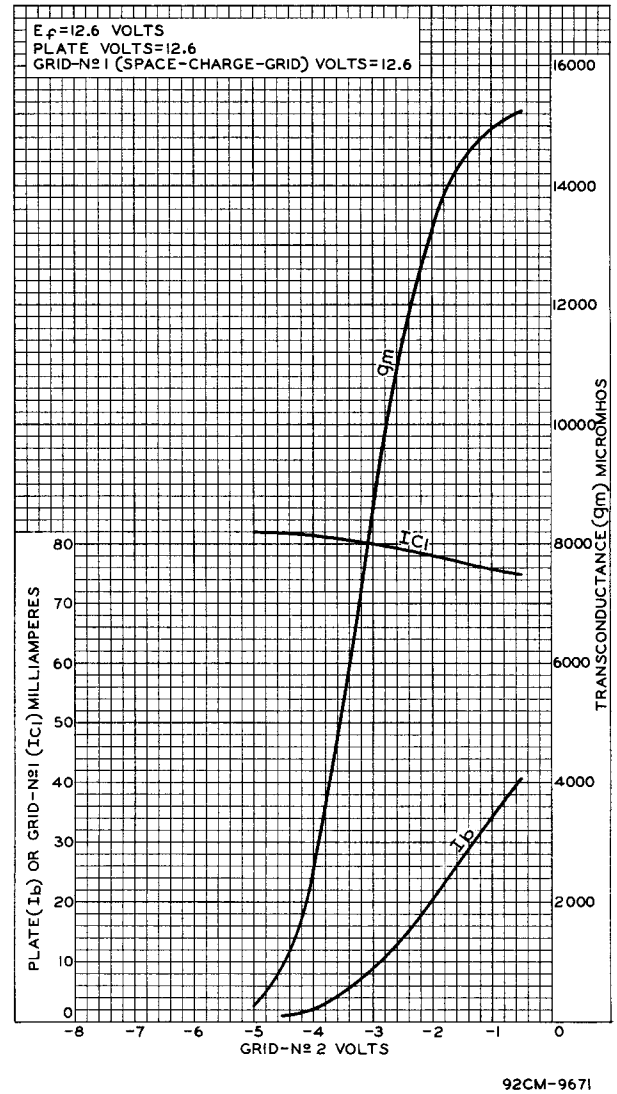
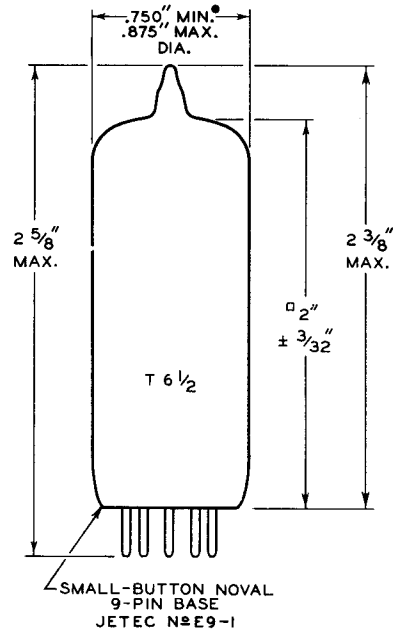


Fig. 2 - Average Characteristics for Tetrode Unit of Type 12DS7.

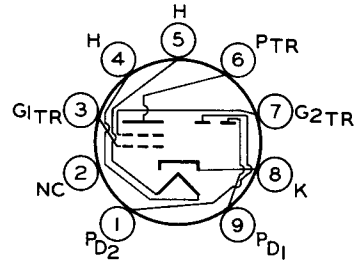
DIMENSIONAL OUTLINE



● APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.

□ MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY RING GAUGE OF 7/16" I.D.

SOCKET CONNECTIONS
Bottom View



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PIN 1 – PLATE OF DIODE UNIT No.2
PIN 2 – NO CONNECTION
PIN 3 – GRID No.1 OF TETRODE UNIT
PIN 4 – HEATER
PIN 5 – HEATER
PIN 6 – PLATE OF TETRODE UNIT
PIN 7 – GRID No.2 OF TETRODE UNIT
PIN 8 – CATHODE
PIN 9 – PLATE OF DIODE UNIT No.1