

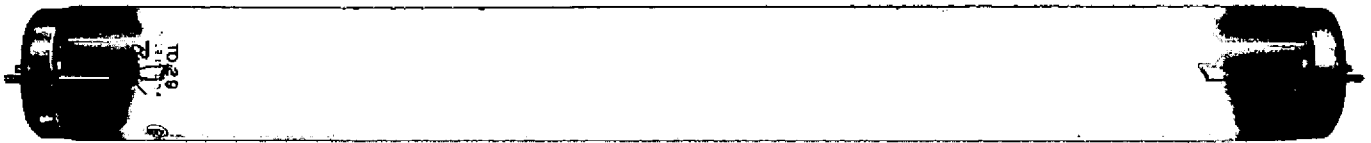


6881 7101  
 7992 8401  
 7147 8402

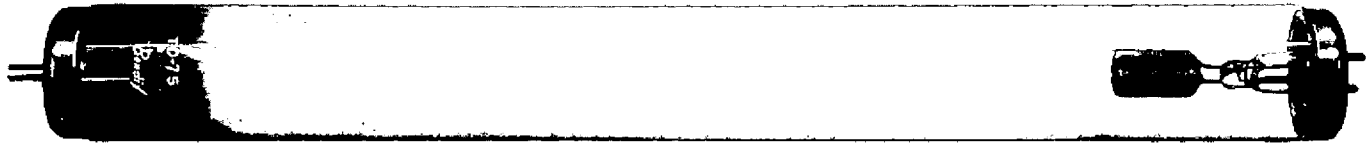
## GAS NOISE SOURCES, 1.12-1.70 K M C



6881/TD-21 , 7992/TD-62



7147/TD-33 , 7101/TD-29



8401/TD-49 , 8402/TD-75

### DESCRIPTION

These tubes are designed for use as noise sources in microwave measurements. They are constructed for use with 90° H-plane mounts in RG-69U waveguide, or equivalent, to provide noise in the 1.12 to 1.70 kMc frequency range. When used in properly matched mounts they function essentially as untuned noise generators over most of the recommended transmission bandwidth of the mount. When used in a 90° H-plane mount which is terminated by a piston adjusted to match the susceptance of the tube and mount, the excess noise coupled into the guide is approximately 15.2 db for the Argon types, 6881, 7147 and 8401, and approximately 18 db for the Neon types, 7992, 7101 and 8402. The excess noise ratio in db is defined as  $10 \log \left( \frac{P_e}{290} - 1 \right)$ .

All of these types may be operated in a DC circuit which provides a starting voltage spike, although the 8401 and 8402 are recommended primarily for pulse operation at duty cycles of less than 50%. The 7147 and 7101 further may be operated in a high voltage AC circuit without provision of an initial starting spike. In all cases the operating circuits must have sufficient series resistance to limit the tube currents to the rated values.

In the cases of the 7147 and 7101 when operated in an AC circuit there is a small correction to the available excess noise depending upon circuit components and the AC frequency. When operated in a DC circuit, only one cathode is active, the other serving as the anode.

The use of pure inert gases eliminates any dependence of noise output on operating temperature. The noise sources are available for measurement at practically zero warm up time.

from JEDEC release #4296, June 10, 1963



## GAS NOISE SOURCES, 1.12 - 1.70 K M C

RATINGS							
Characteristic	Unit	6881/TD21	7992/TD62	7147/TD33	7101/TD29	8401/TD49	8402/TD75
Recommended Mode of Operation		DC	DC	DC or AC	DC or AC	Pulse	Pulse
Anode Current (Peak)	ma	250	250	250	250	200	200
Anode Current (Average)	mAdc	250max	250max	250max	250max	200max	200max
Tube Voltage drop (Average)	Vdc	65	145	75	130	125	235
Tube Dissipation (Average)	Watts	16	36	19	33	25	47
Starting Voltage (Note 1. 3)	KV	2. 0-4. 0	2. 5-4. 5	2. 0-4. 0 (Fig 1) 2. 5 max (Fig 2)	2. 5-4. 5 (Fig 1) 2. 5 max (Fig 2)	2. 0-4. 0	2. 5-4. 5
Starting Current (Note 2. 3)	mAdc	300	350	300	350	300	350
Ambient Temp. Range	°C	-55°to+85°	-55°to+85°	-55°to+85°	-55°to+85°	-55°to+85°	-55°to+85°
Nr-1 Tube in Mount @ Rated Current (Notes 4. 5)	db	15. 20±. 50	18. 0±. 50	15. 20±. 50 (Note 6)	18. 0±. 50 (Note 6)	15. 2±. 50	18. 0±. 50

Note 1: With the noise source in a case grounded mount, starting voltages were measured in Figures 1, 2, or 3 where appropriate.

Note 2: With the noise source in a case grounded mount and the starting current ( $I_{start}$ ) through the choke of Figure I adjusted to the value stated, the noise source will start within three attempts of closing and opening switch SW.

Note 3: In general the starting voltage for DC or pulse operation will decrease with a starting pulse of either a faster rise time or longer pulse width.

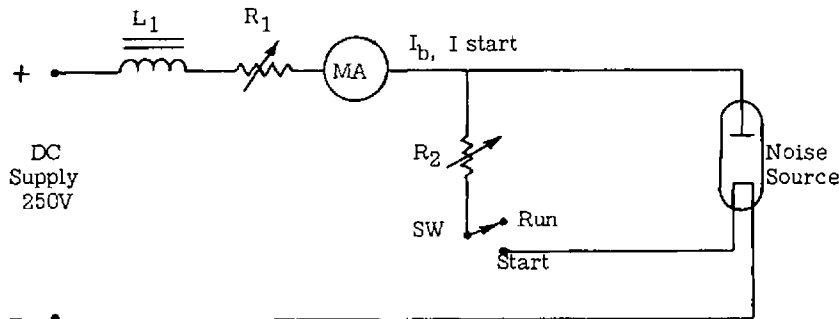
Note 4: The excess noise ratio (Nr-1) is defined in db as  $(Nr-1) = 10 \log \left( \frac{T_e}{290} - 1 \right)$  where  $T_e$  is the effective electron temperature.

Note 5: The values of (Nr-1) are given for the tubes mounted in a 90° H plane mount which is terminated by a piston adjusted to match susceptance of the tube and mount.

Note 6: When operated in an AC circuit there is a small correction to the available excess noise depending upon circuit components and the AC frequency.



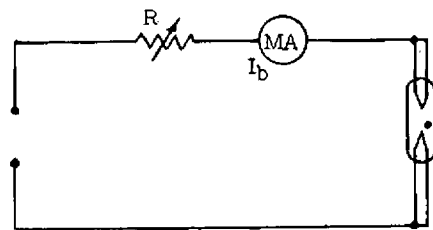
# GAS NOISE SOURCES, 1.12-1.70 KMC



- $L_1$  - 2 Hy, 250 mA
- $R_1$  -  $900\Omega$  - 50W
- $R_2$  -  $500\Omega$  - 50W
- SW - (Momentary)  
normally open

FIGURE 1: Typical Starting and Operating Circuit for D. C. Operation

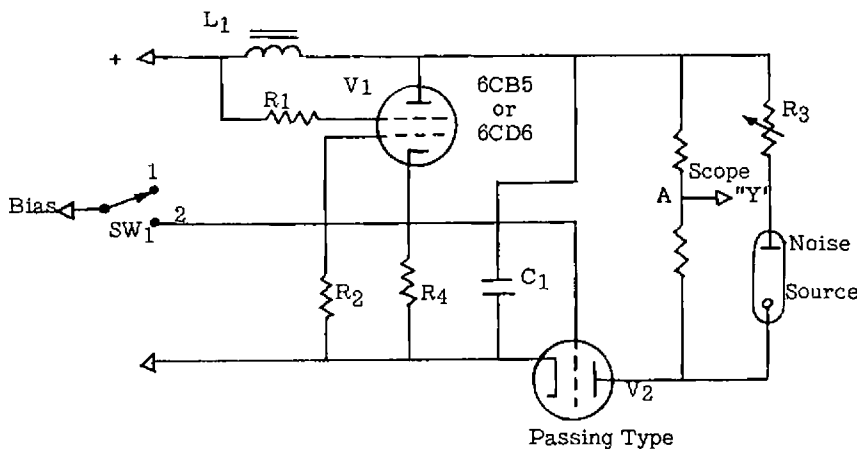
The run start switch shown in the typical circuit provides the high voltage surge or spike necessary to initiate the discharge. In the start position, current passes through the choke. As the switch is released to the run position, a high surge voltage appears momentarily across the tube, caused by the collapse of the magnetic field in choke "L1". This high voltage initiates the discharge in the noise source which is then sustained by the power supply voltage and stabilized by the resistance  $R_1$ .



- $E$  = 2500 Vac
- $R$  =  $9500\Omega$  600 W

NOTE:  
R MAY BE INCLUDED IN  
SUPPLY AS REACTANCE

FIGURE 2: Typical Starting and Operating Circuits for AC Operation



- $L_1$  - 2 Hy
- $R_1$  - 5 K
- $R_2$  - 10 K - adjusted for required pulse amplitude
- $R_3$  - 1.5 K - adjusted for rated  $I_b$
- $R_4$  - Start-run or on-off switch
- $C_1$  - surge capacitor
- $V_1$  - turn-on tube
- $V_2$  - turn-off tube

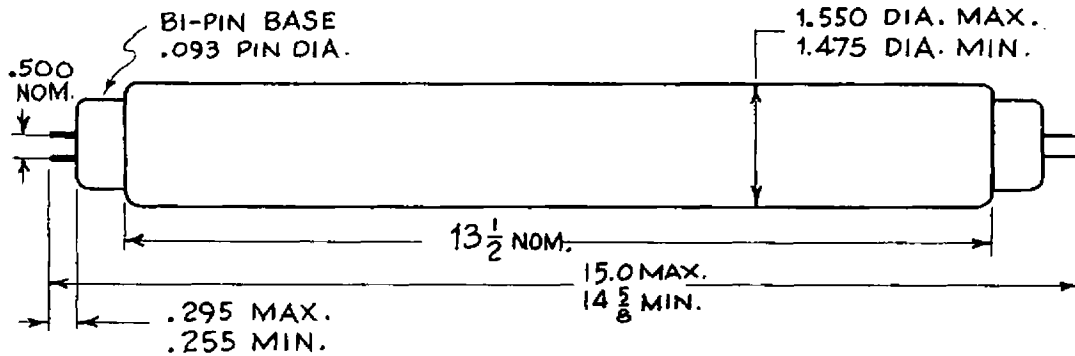
FIGURE 3: Typical Starting and Operating Circuit for Pulse Operation

The pentode or beam tube,  $V_1$ , acts as a switch interrupting the current flow in  $L_1$  when the bias switch,  $SW_1$  is in position 1. The resultant voltage spike developed is impressed across the noise source. The current limited by  $R_3$  to rated value. The noise source is turned off when the bias switch,  $SW_1$ , is in position 2, causing the current through the passing tube,  $V_2$ , to be interrupted. The circuit can be modified to drive the grids of the switch tube and passing tube with pulses, thus pulsing the noise output.



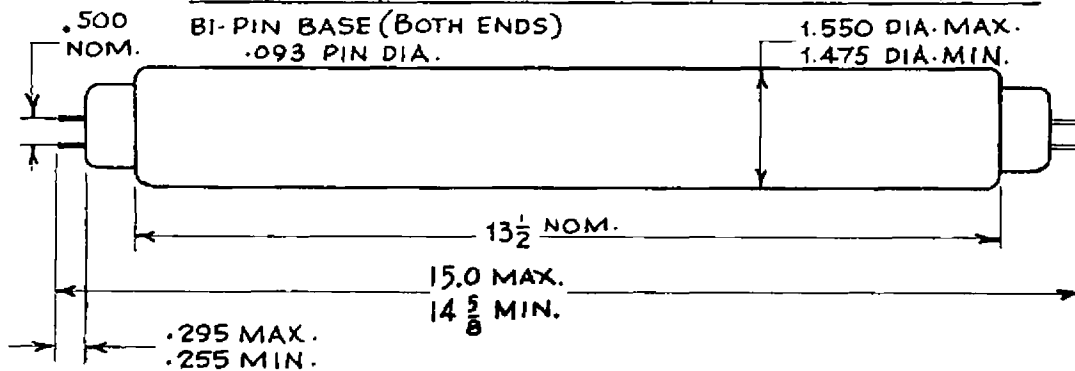
# GAS NOISE SOURCES, 1.12-1.70 KMC

## OUTLINE DRAWINGS



### DC AND PULSE TYPES

6881/TD 21, 7992/TD G2, 8401/TD 49, 8402/TD 75



### AC-DC TYPES

7147/TD 33, 7101/TD 29

## MOUNT

NOTE: SILVER PLATE  
MASK TOP OF FLANGE AND  
BOTH ENDS BEFORE PAINTING  
SMOOTH GRAY.

