

# BEAM SWITCHING TUBE



engineering data report

## 6703

### Magnetron Beam Switching Tube (BD-301) HIGH VACUUM, TEN OUTPUT

#### ELECTRICAL

Heater, Voltage	6.3 ±10% V
Current at 6.30 V	0.3 A. ±10%

#### MECHANICAL, See Figure 1

Overall length (Including Cap)	3.155 +.335, -.000
Seated height (Including Cap)	3.074 ± .159"
Diameter	2.250 +.010, -.000
Shield length, with protective cap	2.672 max.
Shield length, without protective caps	2.562 ±.010
Envelope connections	see figure 2
Socket, 26 pin (SK-100)	see figure 3
Weight, total	16 oz. max.
Mounting Position	Any (see note 7)

#### INTERELECTRODE CAPACITANCES (typical)

Any spade to all other elements (including heater)	4 uuf
Any target to all other elements (including heater)	4 uuf
Odd grids (5) to all other elements (including heater)	10 uuf
Even grids (5) to all other elements (including heater)	10 uuf
Cathode to all other elements (including heater)	6 uuf

#### MAXIMUM RATINGS

Target voltage	300 V
Spade voltage	200 V
Grid voltage	200 V
Heater-cathode voltage	±90 V
Individual target dissipation	1 watt
Switching Speed	From static to above 2 Mc. Note 6

#### TEST CONDITIONS AND SPECIFICATIONS See Note 1, 2

Target voltage ( $E_{TT}$ )	Spade voltage
Target, individual output current ( $I_T$ )	6.5 ±1.0 ma. see note 5
Target, Load Resistor ( $R_T$ )	3.3K ohms
Cathode current ( $I_K$ )	7.5 nom.
Spade voltage ( $E_{SS}$ )	100 ±15V d.c. see note 2
Spade current ( $I_S$ )	1.0 ma. Nom.
Spade load resistor ( $R_S$ )	100 K ohms
Grid voltage ( $E_{CC}$ )	+25 V d.c. see Note 3
Grid input pulse amplitude ( $E_i$ )	-50 V see Note 3, 6
Cut-off voltage (all spades common)	+200 V see Note 4

BEAM SWITCHING TUBE  
TYPE 6703 (BD 301)

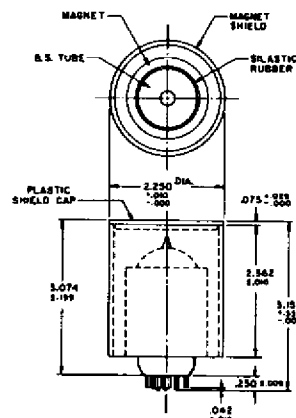


Figure 1  
Outline Drawing

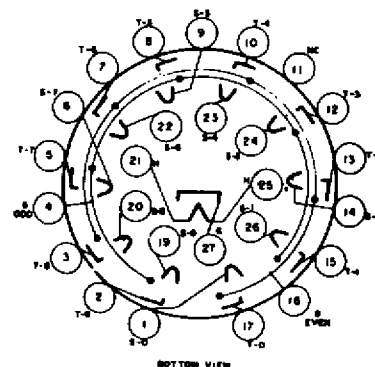


Figure 2  
Envelope Connection Diagram

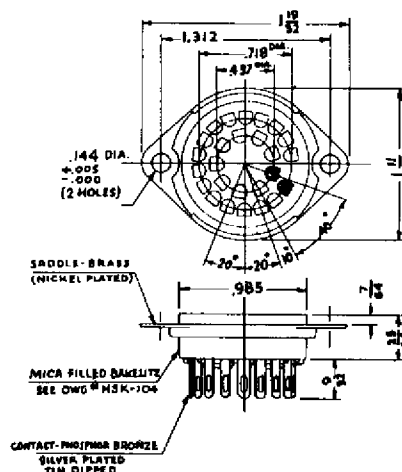


Figure 3  
Contact Socket Assembly  
(Burroughs Part SK-100)

NOTES

1. The tube is tested at 10 KC but will operate in excess of two megacycles under optimum operating conditions.
2. Under the specified test conditions in the test circuit, Figure 6, the tube will be clear and no output current will be produced, when all of the spades are at the spade source potential. As long as the spade source potential does not exceed the Firing voltage (Note 4), a beam will not form spontaneously. Output current may be produced by forming a beam in the tube by lowering the potential of one spade to cathode potential. Once formed, the beam will not clear as long as the spade source voltage exceeds the specified minimum. With the potential of the switching grids at the specified grid bias voltage, the beam will not switch if the spade source voltage does not exceed the specified maximum.
3. Under the specified conditions, the beam will not switch if the potential of the switching grid at the position where the beam is formed exceeds the specified grid bias voltage.
4. Firing Voltage (DC Cut-Off Voltage): That voltage between cathode and spade bus above which spontaneous electron beam formation can occur. See Bulletin BX-535, page 5, for detailed explanation.
5. The tube is a constant current device having pentode type output characteristics. For a fixed value of spade voltage, output current at a given output is constant over a wide range of target voltage; however, because of normal manufacturing tolerances, the amount of target current can vary from target to target. With the tube operating in the test circuit, Figure 6, and with the spade and target supply voltages fixed at 100 volts, the target and cathode current measured with the beam at each of the ten targets must be within the specified limits.
6. (a) The beam is switched to the next position by applying a negative change in potential to the switching grid at the position where the beam is formed. Once the beam has switched from this position, the potential on the switching grid at this position no longer affects the beam. When the tube is operated in the test circuit as specified, the grid switching voltage specified in the minimum change in potential from the specified grid bias voltage which will always switch the beam. At switching rates above 10 KC, the drive pulses to the switching grids must increase in amplitude as the frequency increases in order to overcome capacitive effects. With switching grid pulses of appropriate amplitude, the tube will operate at switching rates exceeding 2.0 MC.  
 (b) The switching grids are electrically connected inside the tube into even and odd sets. The switching voltages are alternately applied to the even grid and odd grid terminals.
7. The tubes are magnetically shielded and can be mounted side by side without significant interactions; however, magnetic shielding is not complete at the ends of the tube. The tubes should not be mounted with magnetic materials within one inch of either end. To avoid stress between the glass envelope and shield, the tube should be mounted by clamping the magnetic shield to the chassis. The tube base and socket should not be clamped firmly, but should be allowed to float freely.

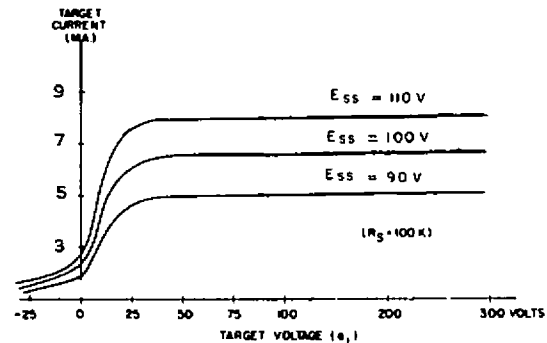


Figure 4  
Typical Outline Characteristic

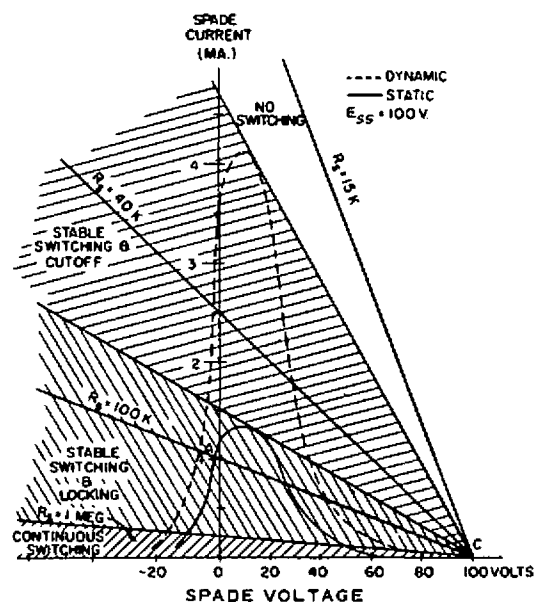


Figure 5  
Typical Beam Forming and Locking Spade Characteristic

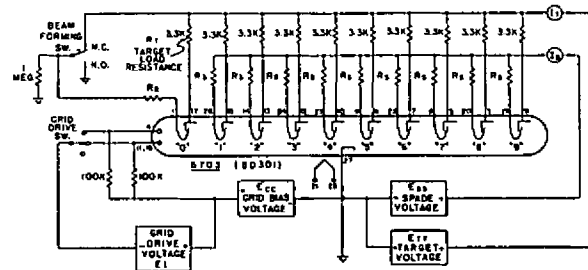


Figure 6  
Basic Circuit for 6703