7703 BK472
BK474 BK476

IGNITRONS

INTRODUCTION: Ignitrons for Switching Applications

The choice of an ignitron for switching service is dependent upon several conditions. One of the most important is the extent of current reversal in ringing circuits and a molybdenum anode type is generally considered to be best for this usage. For high reliability at high voltage a type with a complex anode seal may be used. In applications requiring the use of several ignitrons in parallel, then high triggering reliability is essential if the ignitrons are to fire simultaneously or in a predetermined sequence, and here again a molybdenum anode is preferred.

If current reversal is limited, or if reduced life is acceptable, then a tube with a less expensive anode material of stainless steel or graphite can be used.

All four ignitrons have the same ratings; the 7703 will give the best life under arduous conditions and the others are intended for less severe applications.

Brief details of the ignitrons are as follows:

7703 employs a molybdenum anode and complex anode seal for the most severe applications of high voltage and high current reversal (up to 85%). The area around the anode seal is potted.

BK472 employs a stainless steel anode and simpler anode seal with slightly increased length. It is therefore suitable for a reduced degree of current reversal and for d.c. switching applications.

BK474 retains the simpler anode seal but includes a molybdenum anode and is therefore most suitable for ringing applications at a reduced voltage and current.

BK476 also has the simpler anode seal but includes a graphite anode. It is suitable for applications where current reversal is zero, and although rated at 20kV may require careful ageing to hold off more than 15kV on repeated switching.

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GENERAL DATA

Electrical

Number of electrodes:

main anode	1
cathode (mercury pool)	1
ignitor	1

Mechanical

Overall length (7703)	7.813 inches (198.5mm) max
Overall length (BK472, BK474, BK476)	8.375 inches (212.7mm) max
Body diameter	2.2 inches (55.88mm) max
Net weight	2 pounds (0.9kg) approx
Mounting position (see note 1)	vertical, anode terminal up

Accessories

Ignitor lead	ZD100222
Water-cooled clamp	ZD100365

MAXIMUM AND MINIMUM RATINGS (Absolute values)

Capacitor Discharge Service (These ratings do not apply to BK476)

Intermittent pulse duty, ringing applications

	Min	Max	
Peak forward anode voltage (see note 2)	0.1	20	kV
Peak inverse anode voltage (see note 2)	—	20	kV
Peak anode current (see graph, page 4)	—	100	kA
Ionization time	0.5		μs approx
Tube inductance	0.04		μH approx
Discharge rate per minute (see note 3)	—	2	

D.C. Short-circuiting Switch Service

	Min	Max	
Peak forward voltage (see note 2)	0.1	20	kV
Peak inverse voltage (see note 2)	—	20	kV
Peak anode current	—	35	kA
Average anode current	—	0.25	A
Averaging time	—	1.0	minute
Ionization time	0.5		μs approx
Tube inductance	0.04		μH approx

Ignitor Circuit Requirements

The recommended excitation circuit consists of a 0.25μF capacitor, charged to a voltage between 1500 and 4000V and discharged through the ignitor-cathode circuit and a current limiting resistor of 2 to 6 ohms. The inverse ignitor voltage must never exceed 5.0V.

Cooling (see note 4)

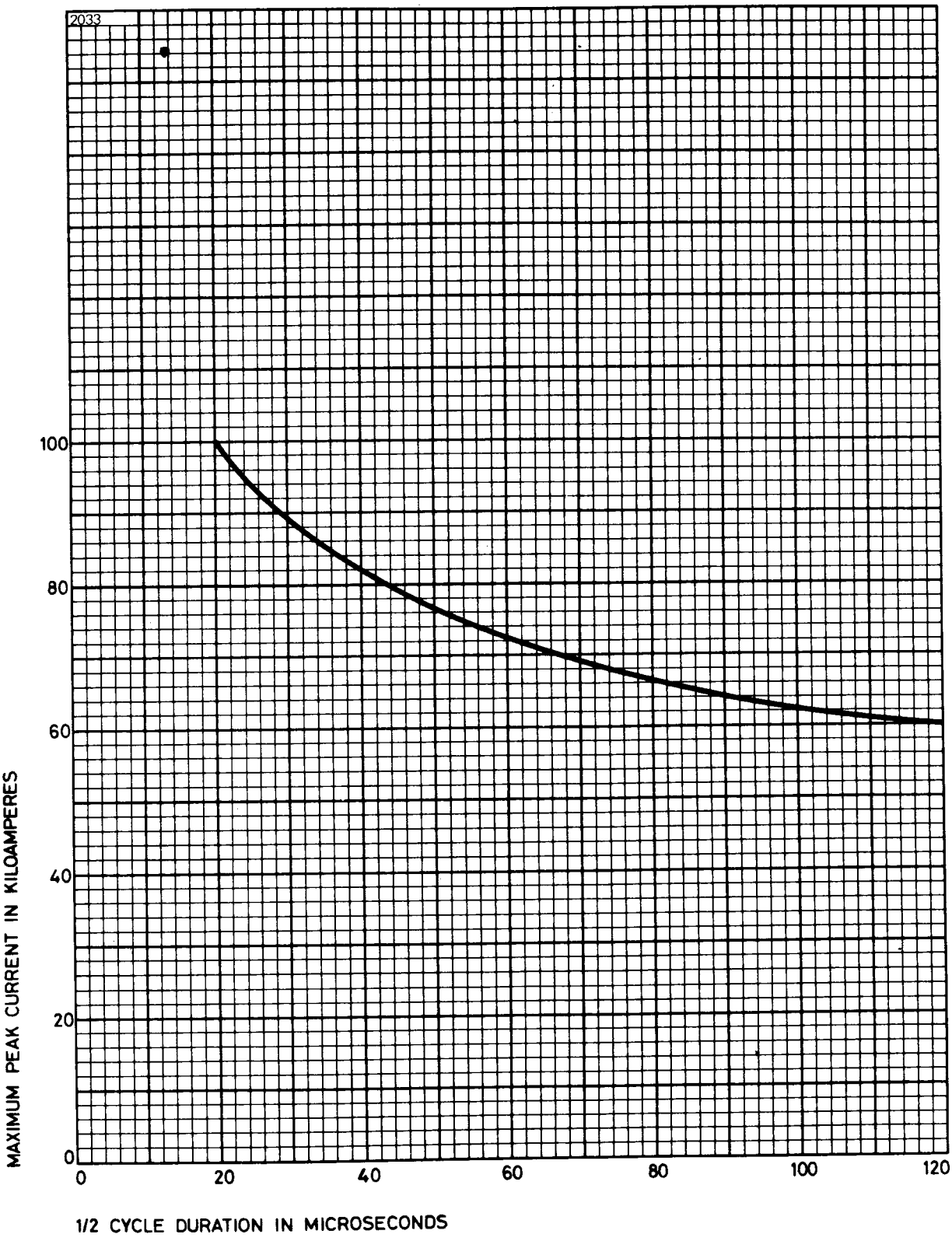
	Min	Max	
Cooling clamp temperature	10	30	°C
Cathode temperature	—	37	°C
Anode insulator temperature	—	70	°C

NOTES

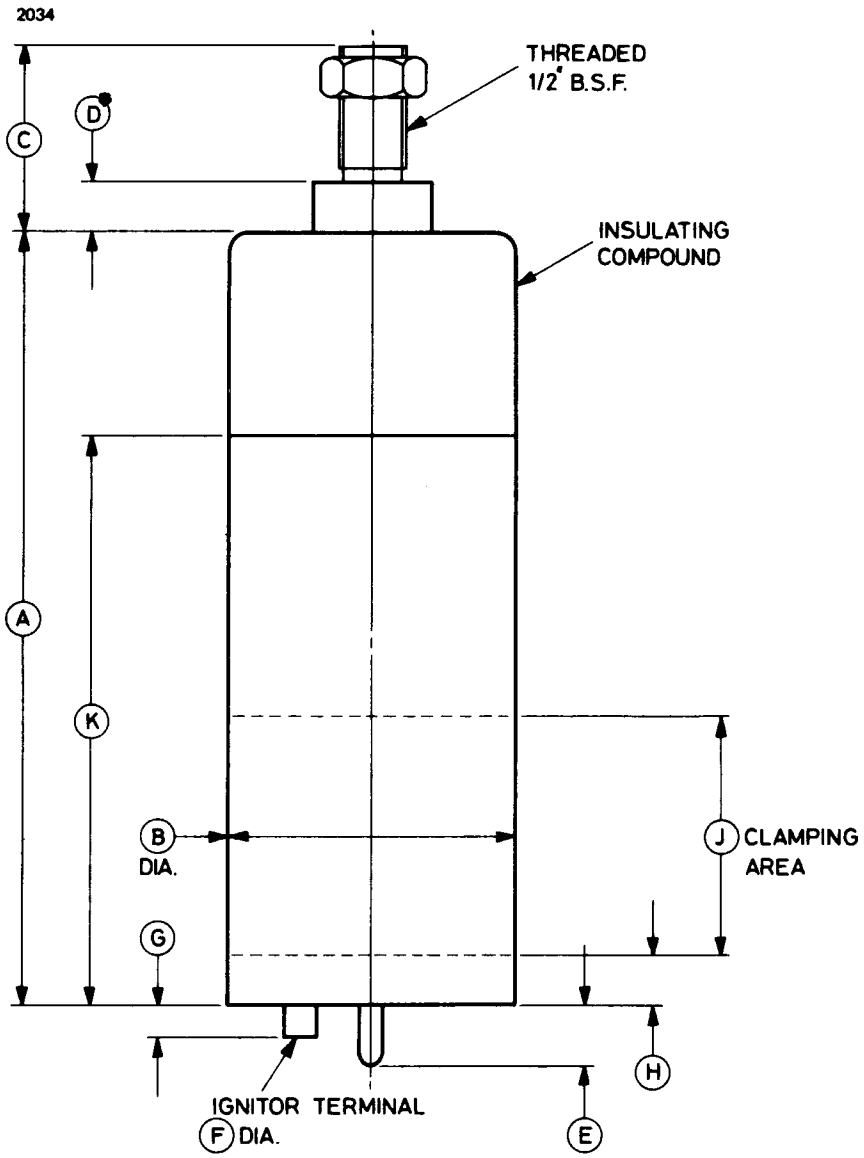
1. The life of the ignitron will be improved if operated in a space free from magnetic fields. Such fields tend to force the arc towards the envelope from which sputtering may occur, resulting in ignitor wetting. A coaxial form of mounting is recommended.
2. After heat-conditioning (see note 4) and before the ignitron is put into operation, it is recommended that it be aged to withstand a voltage of 30 to 35kV without breakdown. This may be accomplished by the application of a variable voltage, preferably d.c. through a current limiting resistor of about 100kΩ. It is useful to connect a capacitor of approximately 500pF directly between anode and cathode.

   The ignitron may not withstand the full rated voltage immediately after conducting. A delay of 1 to 10 seconds is recommended.
3. The ignitrons may be operated at higher repetition rates if the voltage or current is reduced. Users are recommended to apply for advice in these circumstances.
4. The anode insulator temperature must be higher than the cathode temperature at all times. The anode end must be heated before operation to vaporize any mercury in the area of the anode seal. When first installed the anode stud should be heated to about 100°C for two hours. Care is needed during cooling to ensure a cathode temperature lower than the anode seal temperature, to prevent mercury condensation in the anode region.

ANODE CURRENT – PULSE DURATION LIMITS



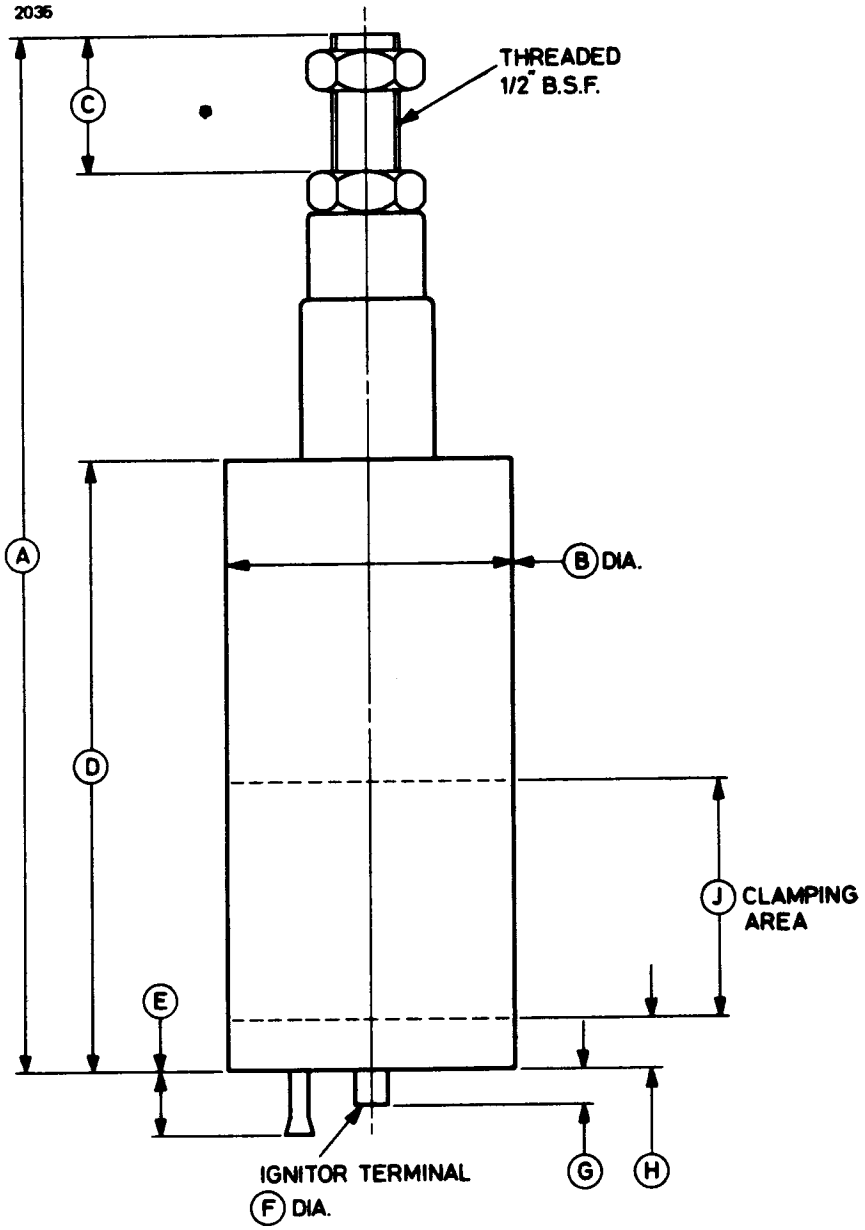
OUTLINE FOR 7703



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	5.687 ± 0.125	144.4 ± 3.2	F	0.250 ± 0.005	6.35 ± 0.13
B	2.130 ± 0.010	54.10 ± 0.25	G	0.250 max	6.35 max
C	1.375 ± 0.125	34.93 ± 3.18	H	0.375	9.53
D	0.375 ± 0.062	9.53 ± 1.57	J	1.750 min	44.45 min
E	0.500 max	12.70 max	K	4.187 ± 0.125	106.3 ± 3.2

Millimetre dimensions have been derived from inches.

OUTLINE FOR BK472, BK474 AND BK476



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	7.625 ± 0.250	193.7 ± 6.4	F	0.250	6.35
B	2.130 ± 0.010	54.10 ± 0.25	G	0.250 max	6.35 max
C	1.000 ± 0.125	25.40 ± 3.18	H	0.375 nom	9.53 nom
D	4.500 ± 0.250	114.3 ± 6.4	J	1.750 min	44.45 min
E	0.500 max	12.7 max			

Millimetre dimensions have been derived from inches.