

## CO.10.1 CARCINOTRON

The CO.10.1 is a millimetric backward wave oscillator, focused by an integral permanent magnet, water cooled and delivering an output power over a frequency range of 275 to 290 GHz.

It can be amplitude modulated through its anode. Frequency modulation can be obtained by line voltage (1) variation, the frequency being independent of the load up to a VSWR of 3 : 1.

The high power obtained at such a high frequency makes it particularly suitable for physical measurements as plasma analysis, parametric resonance, study of the fine structure of the matter. It can be used also for transmission measurements, scaling, etc . . .



In short, the main features of the CO. 10. 1 are :

- Minimum output power : 0.2 W from 275 GHz to 290 GHz  
1 W in one point at least between 280 and 290 GHz.
- Frequency and amplitude modulation .

(1) *Line voltage or beam voltage.*

### GENERAL CHARACTERISTICS

#### Electrical

|                                                            | min.  | max.  |        |
|------------------------------------------------------------|-------|-------|--------|
| Frequency . . . . .                                        | 275   | 290   | GHz    |
| Heater voltage . . . . .                                   | - 8.5 | - 6   | V      |
| Heater current . . . . .                                   | 2.0   | 2.5   | A      |
| Wehnelt (2) voltage . . . . .                              | - 250 | 0     | V      |
| Wehnelt current . . . . .                                  | 0     | -     | mA     |
| Anode (3) voltage for 20 mA line and collector current . . | 800   | 1000  | V      |
| Anode voltage for 30 mA line and collector current . . .   | 1000  | 1500  | V      |
| Anode current . . . . .                                    | 0     | 5     | mA     |
| Line voltage (at lower frequencies) . . . . .              | 5000  | -     | V      |
| Line voltage (at higher frequencies) . . . . .             | -     | 11000 | V      |
| Line and collector current . . . . .                       | -     | 30    | mA     |
| Modulation sensitivity . . . . .                           | 1     | 20    | MHz/V  |
| Pushing . . . . .                                          | 40    | 80    | MHz/mA |
| Collector voltage . . . . .                                | 4000  | 6500  | V      |

(2) *Wehnelt or Focusing electrode.*

(3) *Anode or Accelerator.*



## MECHANICAL

|                     |                  |                  |                       |
|---------------------|------------------|------------------|-----------------------|
| Operating position  | horizontal       | RF output flange | UG 387/U              |
| Focusing            | permanent magnet | Input connector  | HT plug (see drawing) |
| RF output waveguide | RG 138/U         | Weight           | 32 kg                 |

## ABSOLUTE RATINGS (1)

|                 |                |                            |      |        |    |
|-----------------|----------------|----------------------------|------|--------|----|
| Heater voltage  | Vnom $\pm$ 3 % | Anode voltage              | max. | 3 000  | V  |
| Surge current   | 2.55 A         | Anode current              | max. | 10     | mA |
| Wehnelt voltage | 0 V            | Line voltage               | max. | 12 000 | V  |
| Wehnelt current | 5 mA           | Line and collector current | max. | 30     | mA |
| Warm-up time    | 4 mn           | Collector voltage          | max. | 8 000  | V  |
|                 |                | Load VSWR                  | max. | 5 : 1  |    |

## TYPICAL OPERATION (1)

|                |         |                            |       |            |     |
|----------------|---------|----------------------------|-------|------------|-----|
|                |         | Frequency                  | 285   | 289        | GHz |
|                |         | Collector voltage          | 5 500 | 5 500      | V   |
|                |         | Line voltage               | 8 800 | 9 760      | V   |
|                |         | Line and collector current | 30    | 30         | mA  |
|                |         | Anode voltage              | 1 130 | 1 130      | V   |
|                |         | Anode current              | 0     | 0          | mA  |
|                |         | Wehnelt voltage            | 0     | 0          | V   |
|                |         | RF output power            |       | see curves |     |
| Heater voltage | - 7.8 V |                            |       |            |     |
| Heater current | 2.2 A   |                            |       |            |     |
| Warm-up time   | 4 mn    |                            |       |            |     |

(1) All voltages are referred to the cathode.

## OPERATING INSTRUCTIONS

### Application of voltages :

- Start the liquid flow through the line cooling circuit.
- Start the distilled water through the collector cooling circuit.
- Apply voltages in the following order : heater (allow four minutes minimum cathode warm-up time), Wehnelt, line, collector, anode.

### Protective measures :

- A minimum distance of 25 cm should be kept between the tube and any magnetic material.
- Do not try to obtain modulation through the Wehnelt voltage.
- Operating parameters are given in each tube test data sheets, and are always within the absolute ratings indicated here.

The supply should feature the following current limitations :

|           |     |    |
|-----------|-----|----|
| Heater    | 2.5 | A  |
| Wehnelt   | 5   | mA |
| Anode     | 5   | mA |
| Line      | 30  | mA |
| Collector | 30  | mA |

- Protection against shorts or flashes which could occur in the tube.
- Warm-up timing.
- External water interlock for line and collector cooling circuit.
- Line overvoltage (line voltage  $\geq$  Anode voltage + 1 500 V).



**THOMSON-CSF**  
GROUPEMENT TUBES ELECTRONIQUES

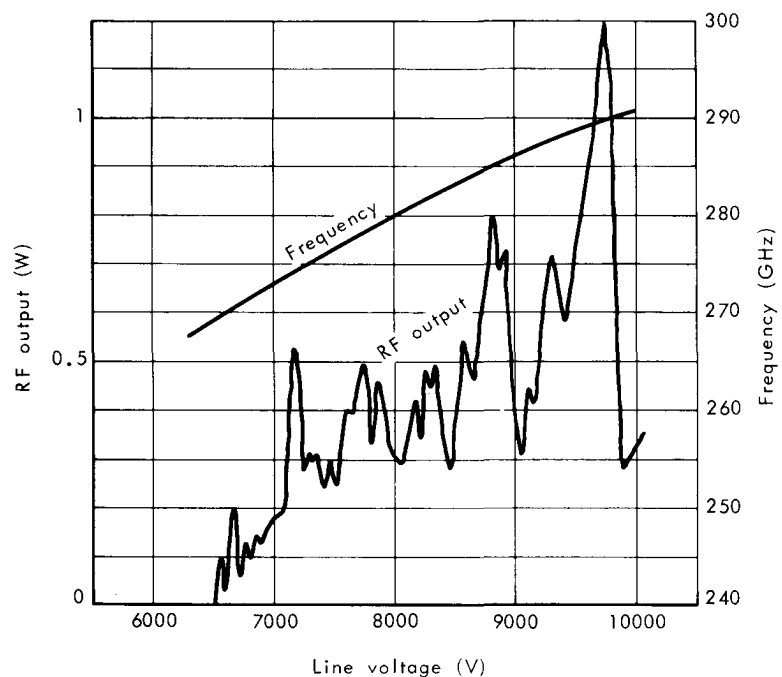
DATA TEH 4321

CO. 10. 1

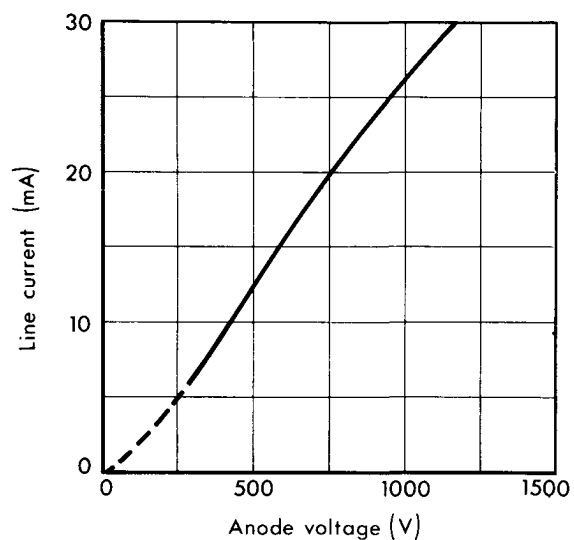
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### characteristic curves (typical values)

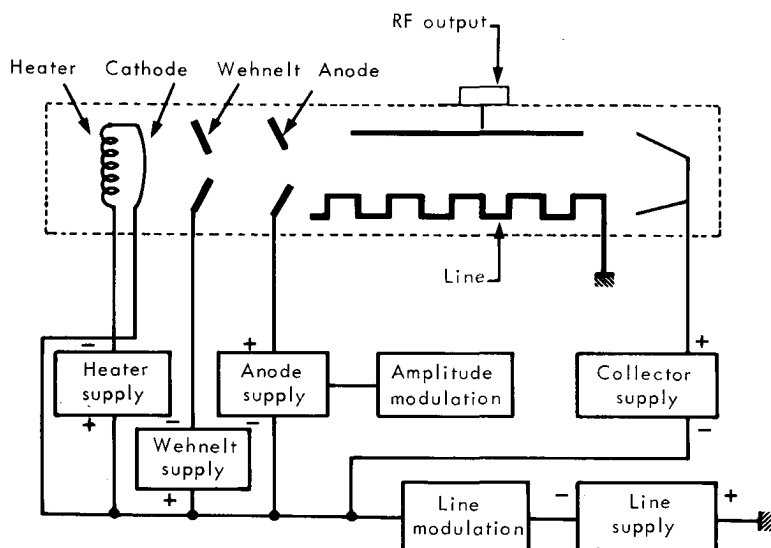
Heater voltage (dc) - 7.8 V  
Heater current (dc) 2.2 A  
Collector voltage (dc) + 5500 V  
Anode voltage (dc) + 1130 V  
Cathode current (dc) 30 mA



Heater voltage (dc) - 7.8 V  
Heater current (dc) 2.2 A  
Collector voltage (dc) + 5500 V  
Line voltage (dc) 6000 V



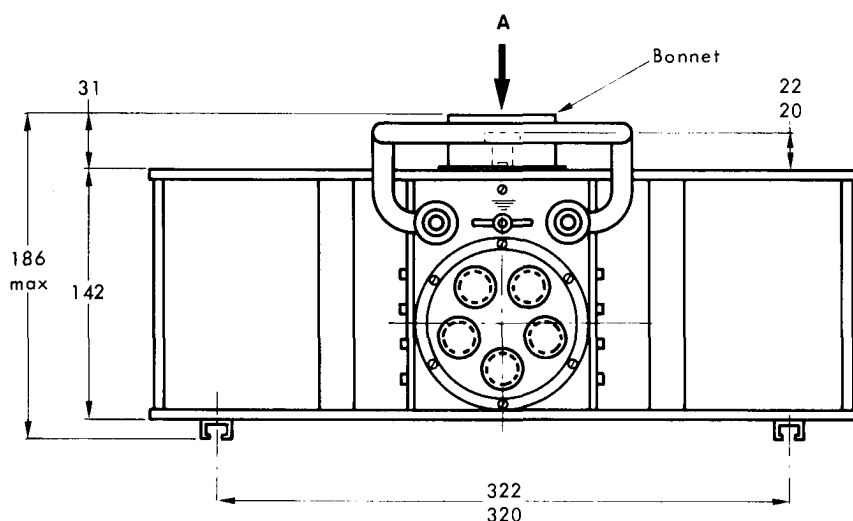
### supply diagram



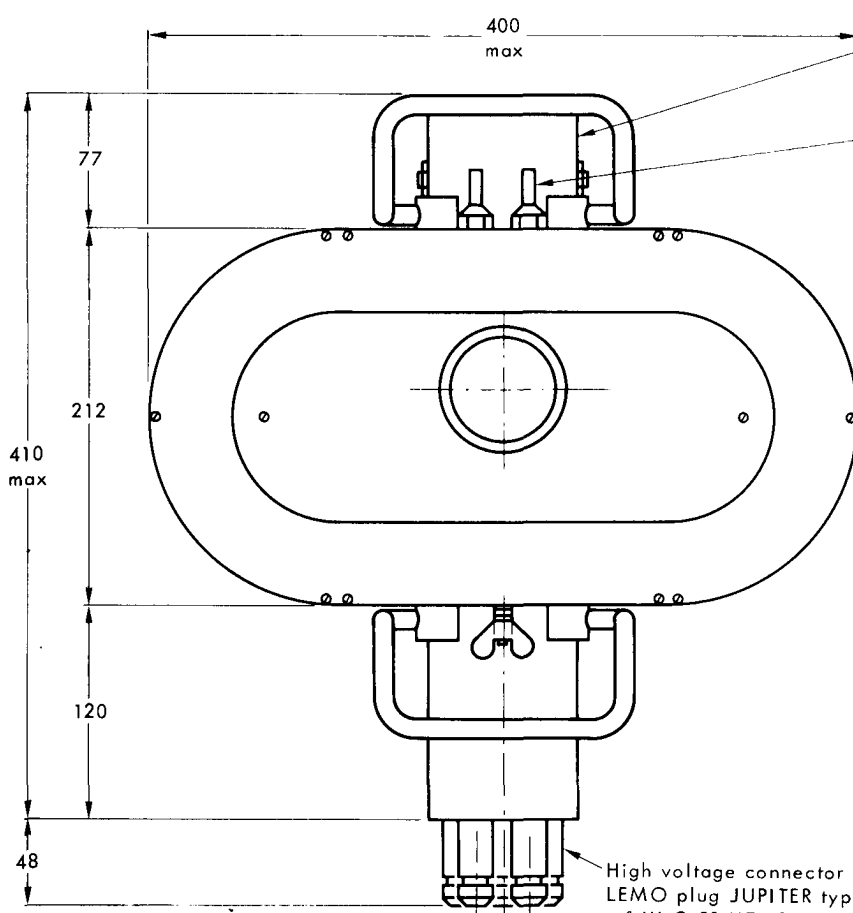
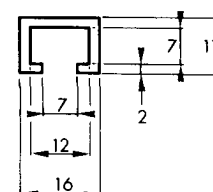


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# OUTLINE DRAWING



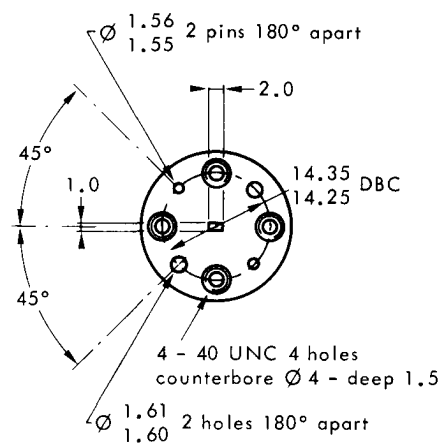
POSITIONING RAIL



2 "BAG-UNION" coupling  
for Ø 6 tubing (line cooling circuit)

2 insulating ajutage O.D Ø 7  
(collector cooling circuit)

RF OUTPUT  
view A



Dimensions in mm.

