



DEPARTEMENT DE RECHERCHES  
ELECTRONIQUE ET ATOMISTIQUE  
CORBEVILLE

# **ELECTROSTATIC MEMORY ANALYSER TUBE**

## **TMA 403 X**

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(Provisional instruction booklet)

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This tube enables electric signals to be stored in the form of a pattern of charges deposited by induced conductivity on a thin insulating target by means of a high voltage writing gun.

Stored signals are read by a second gun which releases them some arbitrary time after writing.

Tube type TMA 403 X is very flexible in use for all cases requiring the use of a target of large capacity :

- on writing, several successive signals can be added
- on reading, a suitable scan enables the signals to be recovered in any arbitrary order which way differ from the order of writing
- reading and writing can be done simultaneously without any interaction.

1 - DIMENSIONS, PIN ARRANGEMENTS

These are shown in the attached drawing N° 9 240 911.

2 - SUPPLY VOLTAGES

In order to give the characteristics of each gun separately, the voltages will be given as from the cathode as for oscilloscopes of usual types. A general diagram will then give the relative values of the potentials of the various electrodes with respect to the target, this being the only point common to writing and to reading.

2.1 - Writing gun : triode type with electrostatic focusing and magnetic deflection :

- filament voltage	6.3 volts
- filament current	1 amp
- maximum anode voltage	10 kV
- focusing voltage	25 to 30% of the anode voltage
- gun electrode bias (cut off voltage)	- 30 to - 60 V

NOTE

A maximum anode voltage was given since it may depend on the use to which the TMA 403 X tube is put. If a long remanence is required (some thousands of readings), it is better to use the maximum voltage; if a very short one is required (some tens of reading scans), lower voltages are more appropriate.

2.2 - Reading gun : tetrode type with electrostatic focusing and deflection

- filament volts	6.3 volts
- filament current	1 amp
- G1 gun electrode cut off voltage	- 25 $\pm$ 10 volts
- G2 screen voltage	<b>300 volts</b>
- A1 focusing voltage	350 to 400 volts

NOTE

In exceptional cases, the G2 voltage may be raised to + 500 volts in order to increase the beam current without loss of definition (but at the cost of a shorter life).

Voltages required for scanning a square inscribed in the target. (maximum anode voltage 1 500 volts) :

- X plates	380 volts
- Y plates	350 volts

Capacity of deflecting components :

- between Y plates	12 pF
- both Y plates to the 2 <sup>nd</sup> anode	12 pF
- between X plates	12 pF
- both X plates to the 2 <sup>nd</sup> anode	12 pF

### 2.3 - Targets, collectors, general circuit layout

The relative potentials of the various electrodes are shown in the attached drawing N° 9 240 910.

The reading gun charges the free side of the insulating target to a potential close to that of the collector  $C_1$ . The thin aluminium layer in contact with the other side of the insulator is connected to the "target" output metal ring D raised to earth potential. Under the penalty of destruction of the insulating layer the collector  $C_1$  must not be raised to a potential exceeding + 50 volts.

A second collector  $C_2$  has been added, it enables the level of the "iconoscopic blotch" spurious signal to be reduced; this blotch appears in all analyser tubes operating on a secondary emission factor higher than unity. The value of the potential of  $C_2$  is close to that of  $C_1$ ; it has to be determined by experiment.

## 3 - UTILISATION CHARACTERISTICS

### 3.1 - Writing

The input signal is applied to the writing gun electrode, but the latter must never become positive with respect to the cathode. This signal may be from a fraction of a volt to several tens of volts, depending on the scanning speed.

It is essential that the writing spot, correctly focused, be never allowed to remain stationary on the target as the latter might become irremediably damaged.

### 3.2 - Reading

The output signal is of the order of 1 milliwatt for a load impedance of 2 000 ohms, i.e. a useful current of the order of 0.5 microamp. The electrostatic deflection provides for very flexible scanning according to any law, but, mostly, the scan is a TV scan at the rate of 50 frames per second.

It is then possible to repeat the output signal from 500 to 5 000 times before the stored signal is erased, depending on the conditions of use : charges deposited at writing, reading beam current, target bias.

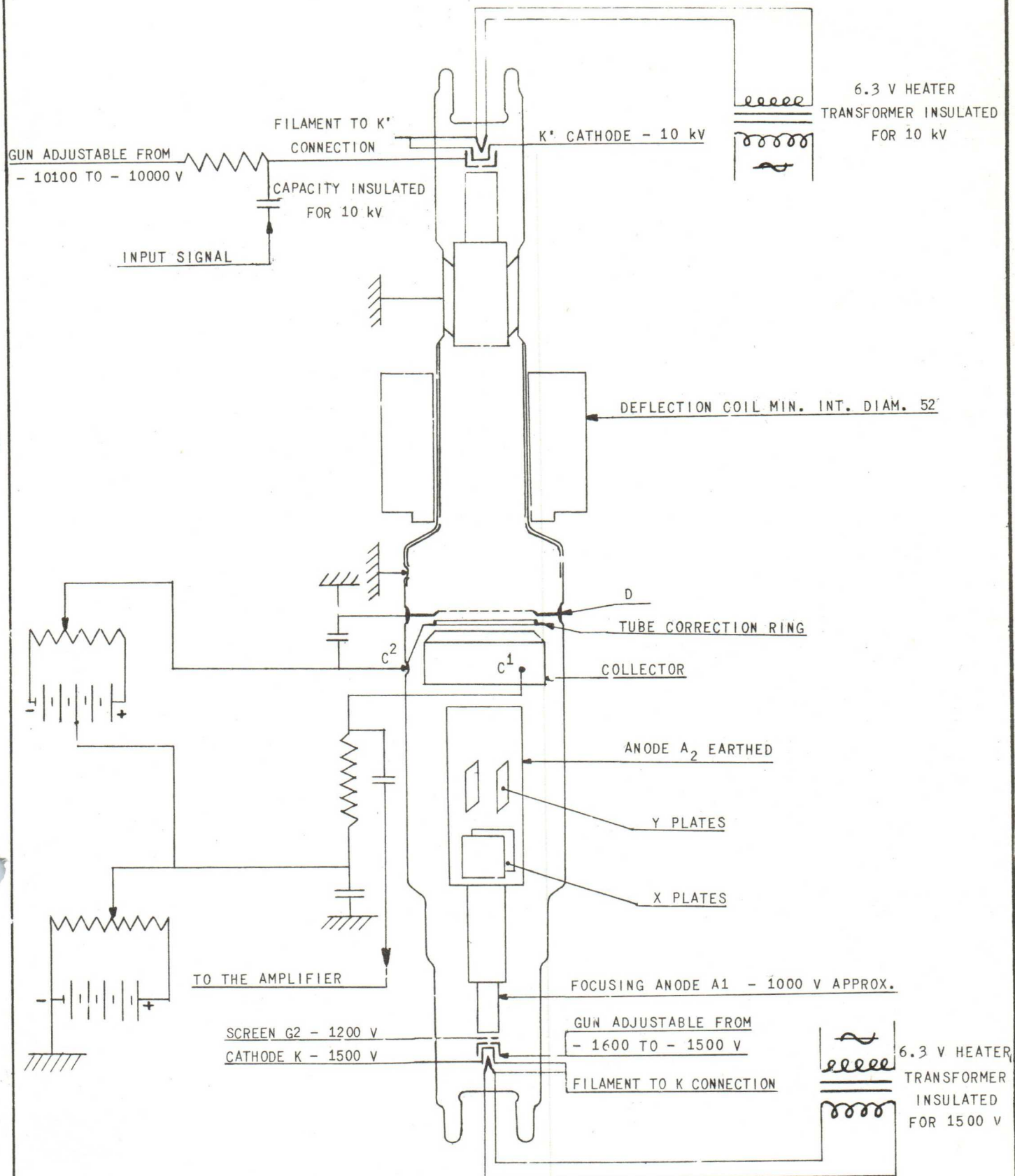
### 3.3 - Overall characteristics

They are mainly the transfer characteristics and definition.

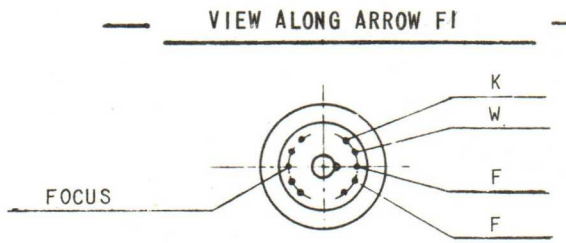
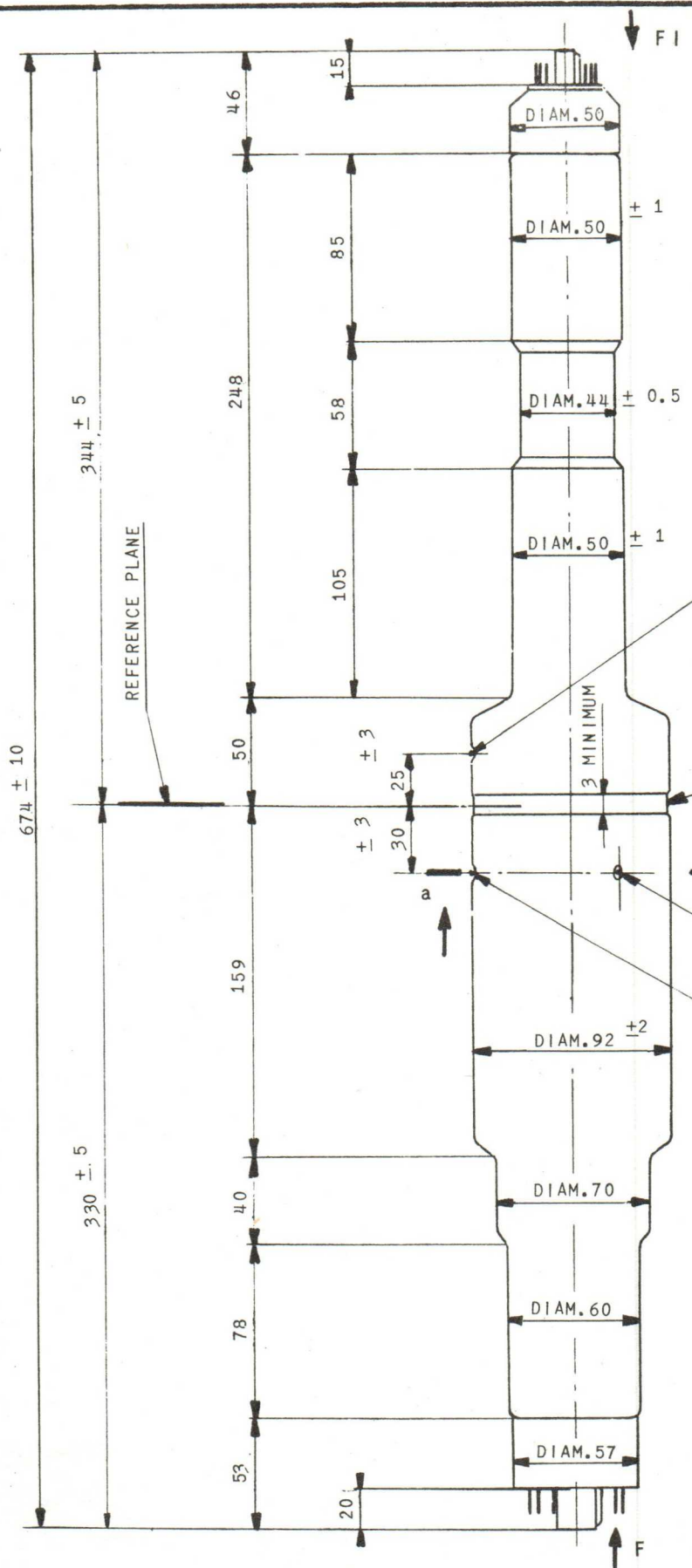
It is not possible to give precise results obtainable from the TMA 403 X tube without stating the exact writing and reading conditions, these being very variable from one application to another.

It may simply be stated that it is possible to obtain half-tones, without, however, attaining the quality of professional television.

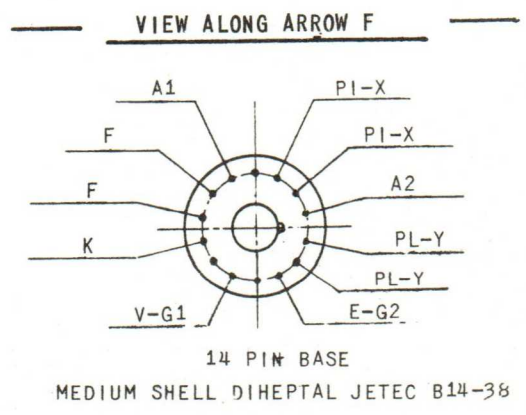
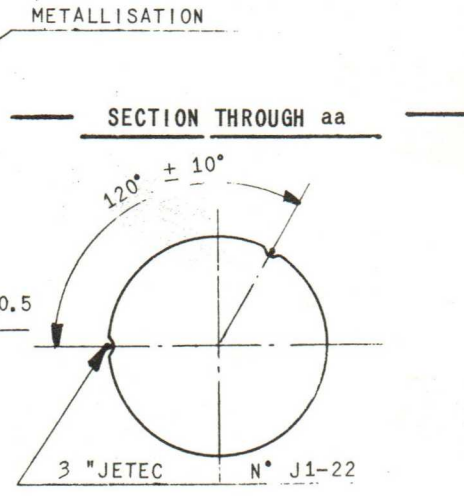
Under best writing conditions, definition is of about 300 to 400 lines.



OPERATING VOLTAGES FOR TUBE TMA 403 X



10 PIN BASE  
T45 - 30 - S.F.R.  
THE TWO REGISTER STUDS ON THE BASE  
ARE DIAMETRICALLY OPPOSITE TO THE  
METALLISATION PRESS-BUTTON



14 PIN BASE  
MEDIUM SHELL DIHEPTAL JETEC B14-38

DIMENSIONS OF TUBE TMA 403 X



