R1001 / 3C36 - National Union UHF Power Triode



- The R1001 NU internal code is visible on the left of the third image.

This quite crude R1001 prototype was made by National Union towards the end of WWII. It was registered in America in February 1946, only after the end of the war, as 3C36. Likely related to radar ancillary equipment, advanced navigation or IFF. Despite its registration, no known use was made in US. It is not even mentioned in the British CV list and there are no info about uses in the Royal Canadian Air Force. Indeed this tube is considered extremely rare, as it never came out of the experimental phase. Maybe that its design was related to advanced sets, canceled at the end of the war before it could enter into production. See also **3C27**, **3C27B** and **3C37**, all of the same manufacturer and all derived by GEC milli-micropups.

According to the datasheet, NU R1001 was a power triode intended for pulse operation between 500 and 1500 MHz. Data were quite impressive, well proving the skill of National Union and the tremendous increase of performance in vacuum tubes through the war. It was rated for 200 W plate power dissipation when fitted with forced-air cooling radiator and up to 500 W when fitted with an optional water jacket. At 6.3 V, 2.8 A heater, 50 A peak emission current was attainable. By comparison the huge 527A was rated for 100 A peak emission, but its filament required 5.5 V at 135 A, a power 45 times higher!

Its shape is absolutely unique, with coaxial cathode-heater connector, the large grid disc and the smaller anode top hat, terminating in the glass exhaust tip. The grid is a squirrel cage type, similar to the one of micropup tubes. Halfway between a British ‘micropup’ and a General Electric ‘Lighthouse’. Data of 3C36 can be found in the RMA record 473 below.

NATIONAL UNION ELECTRON TUBE

NEW DATA

N. U. - 3 C 3 6

U.H.F. POWER TRIODE

The National Union 3C36 is a water or air cooled ultra-high frequency power triode especially designed for operation in the medium micro-wave range between 500 and 1500 megacycles. It is particularly useful in grounded grid type circuits giving stable triode performance in Class C oscillator service throughout this range. As an example it is possible to obtain better than 100 watts useful R.F. Power Output from a single tube at 1000 megacycles when operating at the rated maximum anode dissipation of 500 watts. At 750 megacycles and lower, the efficiency is greater than 50%, allowing a maximum power output of 250 watts to be obtained under similar conditions.

ELECTRICAL CHARACTERISTICS:-

Cathode: Oxide Coated Unipotential	
Heater Voltage	6.3 Volts AC or DC
Heater Current	2.8 Amps.
Amplification Factor	30
Transconductance (Ib = 50 ma, Eb = 500 volts)	8000 umhos
Maximum Frequency of Operation	1500 megacycles

MAXIMUM RATINGS:-

Heater Voltage	6.3 ± 5% volts max.
Average Grid Current	60 ma.
Anode Voltage	2000 volts max.
Average Anode Current	250 ma.
Peak anode current	50.0 Amps
RMS current not to exceed	0.8 Amps
Anode Dissipation:	
Water Cooled (1 liter per minute)	500 Watts max.
Air Blast Cooled	200 Watts max.

DIRECT INTERELECTRODE CAPACITANCES:-

Plate to Cathode	0.017 uuf.
Grid to Cathode	7.2 uuf.
Grid to Plate	5.3 uuf.

MECHANICAL CHARACTERISTICS:-

Maximum Overall Dimensions	
Length	3 1/4 inches
Diameter	1 3/8 inches
Mounting Position	Any
Terminal Connections	See Fig. 4
Type of Cooling -	Water
At reduced ratings	Air Blast

TYPICAL OPERATING CONDITIONS:-

Grounded Grid Class C Oscillator Service (See Fig. 5)

Frequency	1000 Megacycles
Anode Voltage	1500 Volts
Cathode Resistor	150 Ohms
Grid Resistor	2500 Ohms
Anode Current	250 Ma
Grid Current	30 Ma
Power Output	60 Watts

* * * * * * * * * *

SEE PAGE 2

Prepared by
Commercial Engineering Division
NEWARK NATIONAL UNION RADIO CORPORATION NEW JERSEY

N. U. - 3 C 3 6

U.H.F. POWER TRIODE

The following additional features make the National Union 3C36 particularly desirable where moderate power C. W. output is required between 500 and 1500 megacycles.

1. The overall dimensions of the 3C36 (3 1/4" long, 1 3/8" dia.) are such as to allow the use of highly efficient resonant cavity and concentric line circuits at maximum frequencies in this range.
2. To facilitate the highest degree of performance in grounded grid circuits, the grid connection is located between cathode and anode connections, and the cathode-anode capacitance is kept to a minimum.
3. The heater for the unipotential cathode is completely shielded from the R.F. portions of the tube and large low-loss, low impedance connections are employed to the other electrodes. (Fig.4)
4. Construction of the tube along the cylindrical principle reduces to a minimum interelement dimensional changes due to temperature variation under operation.
5. The surfaces (internally and externally) over which the radio frequency currents flow are silver plated giving low loss operation.
6. Glass-to-metal seals are employed extensively in the construction of the NU-3C36 and represent the practical application of the most recent advances in this technique.
7. Air blast cooling may be employed with this tube if the plate dissipation is not allowed to exceed 200 watts. Recommended forms of cooling units are shown in Figs. 1 & 3.

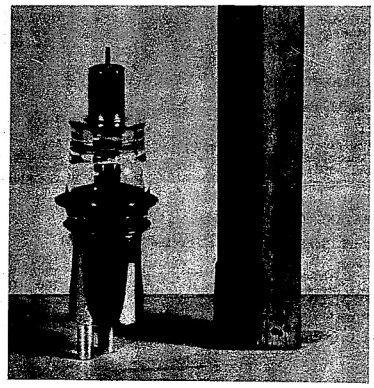


FIG. 2

JANUARY 1, 1946

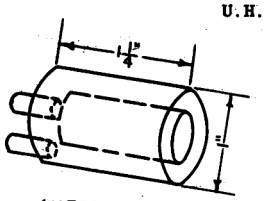
SEE PAGE 3

Prepared by
Commercial Engineering Division
NEWARK NATIONAL UNION RADIO CORPORATION NEW JERSEY

NEW NATIONAL UNION ELECTRON TUBE DATA

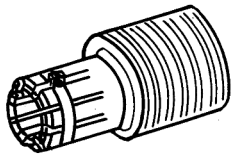
N. U. - 3 C 3 6

U.H.F. POWER TRIODE



WATER COOLER ATTACHES TO ANODE END OF TUBE AS SHOWN IN PHOTOGRAPH THIS COOLING UNIT MAY ALSO EMPLOY FORCED AIR BLAST

FIG. 1



ALTERNATE TYPE OF HEATER FOR AIR BLAST COOLING

FIG. 3

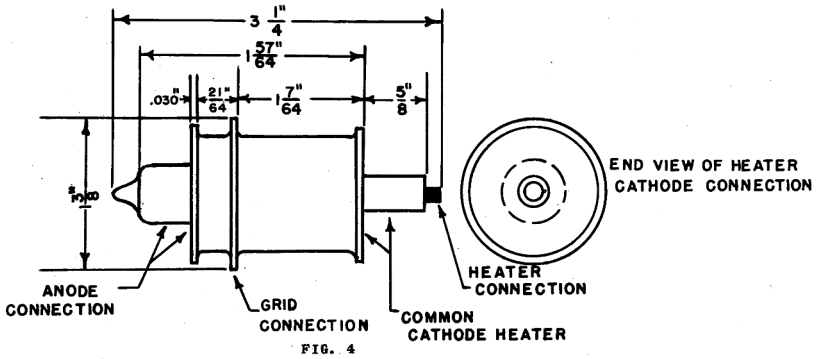


FIG. 4

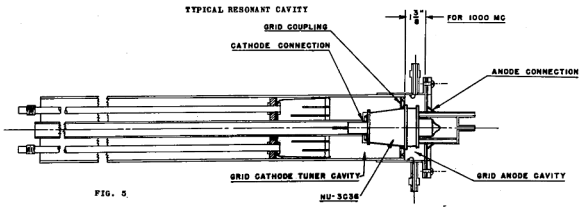


FIG. 5

RE-ENTRANT CAVITY — FIXED FREQ.

* * * * *

JANUARY 1, 1946

Prepared by
Commercial Engineering Division
NEWARK NATIONAL UNION RADIO CORPORATION NEW JERSEY