

STATUS REPORT ON THE COAXITRON DEVELOPMENT PROGRAM

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Several years ago, when the Yale Design Study Group proposed the use of 800 Mc/sec as the operating frequency for the waveguide section of the proton linac, it was recognized that suitable rf power sources were not available. Consideration was given immediately to this problem. It was generally agreed that negative grid triodes offer the best type of power source for proton linacs.

Work at RCA indicated that the "coaxitron" type of tube was promising. The coaxitron is a negative grid triode in which the resonant input and output circuits are contained within the vacuum envelope. The Yale and Los Alamos groups drew up and agreed on a set of performance specifications for an 800 Mc/sec coaxitron based on the estimated performance which RCA felt was reasonable. This has resulted in a fixed price contract between LASL and RCA for RCA to supply five prototype coaxitrons to meet certain performance specifications. The five tubes will be split between LASL and BNL for test and evaluation. The first tube is scheduled for delivery in November 1964 and then one tube per month.

The specifications for this tube are as follows. It is designated as the A15191.

Frequency (midband)	805 Mc/sec
Band width	15 Mc/sec
Gain	10 db (minimum)
Peak power output	1.25 MW
Pulse length	2.2 msec
Pulse rate	30 pps
Duty cycle	6.6%
Cathode	Thoriated tungsten filament
Output connector	Coax to waveguide transition
Input connector	1-5/8" Coax
Tuning adjustments	None
Operating mode	Zero bias, grounded grid
Plate output blocking capacitor	Internal
Plate voltage	~ 35 kV
Plate current	~ 100 A
Cathode area	~ 75 cm ²
Peak emission current	~ 300 A

The A15191 is scaled from the existing type A15038 which produces 5 MW peak power at 450 Mc/sec. At present, the A15191 design has progressed to the point where the cavity design has been verified by cold test measurements. The performance of the electronic circuitry has already been verified in other tubes. The grid-cathode structure is essentially identical with another coaxitron which exists. This is a 900 Mc/sec tube with the following demonstrated performance.

Frequency	~940 Mc/sec
Band width	~ 50 Mc/sec
Gain	11 db
Peak power output	1.4 MW
Pulse length	25 msec
Duty cycle	1%
Plate voltage	~ 35 kV
Plate current	~ 125 A
Cathode	Oxide Filament

MARTIN, J. H.: What is the average power output from the A15191?

WHEELER: Six per cent of 1-1/4 MW. This is hopefully conservative for the anode structure. The only experience we have is with the 400 Mc tube which does appear to be all right at that average power level.

VOELKER: You hope to get more gain than 10 db?

WHEELER: Yes. The more the better. They are already getting 11 db out of the 900 Mc/sec wide band tube and reducing the band width should improve the gain.