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PROGRESS REPORT NO 20
TRAVELING-WAVE TUBES

Index No. 111613 Task 9
Contract N0bsr-57354
January 1954

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February 1954

DEPARTMENT OF THE NAVY, BUREAU OF SHIPS
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PROGRESS REPORT NO. 20

TRAVELING-WAVE TUBES

During the past interval several driver tubes were constructed. A photograph of a driver tube is shown in Figure 1.

R-f tests were conducted on Tube No. 107. Tube results were similar to results obtained in Tube No. 106 in that 400-500 watts of stable output power, using a high magnetic field, could be obtained.

Tube No. 109 was an electron-gun tester incorporating an r-f structure. Tests indicated the need for slight electron-gun modifications in order to eliminate high magnetic field requirements. These modifications were incorporated in Tube No. 110. The circuit loss in this tube was provided by means of a coupled helix structure. When tests were made on the tube, it was determined that the helix structure had been damaged during the assembly process. As a result, the tube oscillated, and thus no tests were possible. Using component parts of Tube No. 110, Tube No. 111 was constructed using a new coupled helix structure. Stable operation was achieved with 450 watts output power at 29 db gain using a normal value of magnetic field. This tube, however, oscillated at low voltage. It is believed that the oscillation was caused by a circuit resonance within the tube envelope. The low output power was attributed to the excessive length of the loss section used in the tube.

Tube No. 111, which is now under construction, has a shorter loss section and should have higher output power. Steps have been taken to remove the circuit resonance that existed in the tube envelope of previous tubes.

Output Tube

The Pierce-type electron gun, which had been constructed, failed mechanically during the exhaust operation, and as a result no tests were made.

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Several r-f slow-wave structures have been studied in the demountable tube structure.

Program for the Next Interval

Construction of Driver Tube No. 112 will be completed and then tested. Several additional driver tubes will be constructed on the basis of data obtained from Tube No. 111.

A second Pierce-type electron gun for the output tube will be fabricated, and further mode studies of slow-wave structures will be made.

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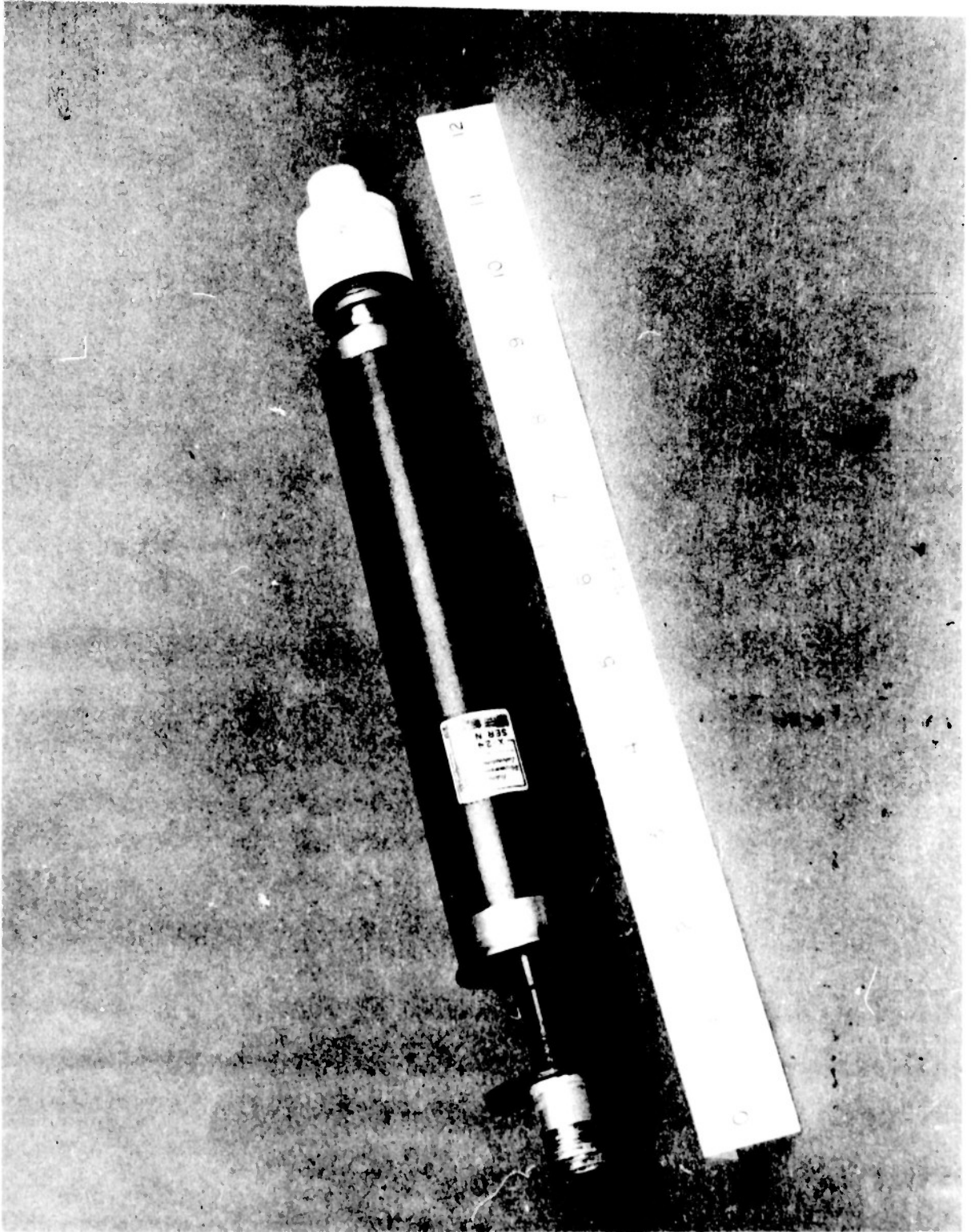


FIG. 1 X-241 S-BAND DRIVER TUBE

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