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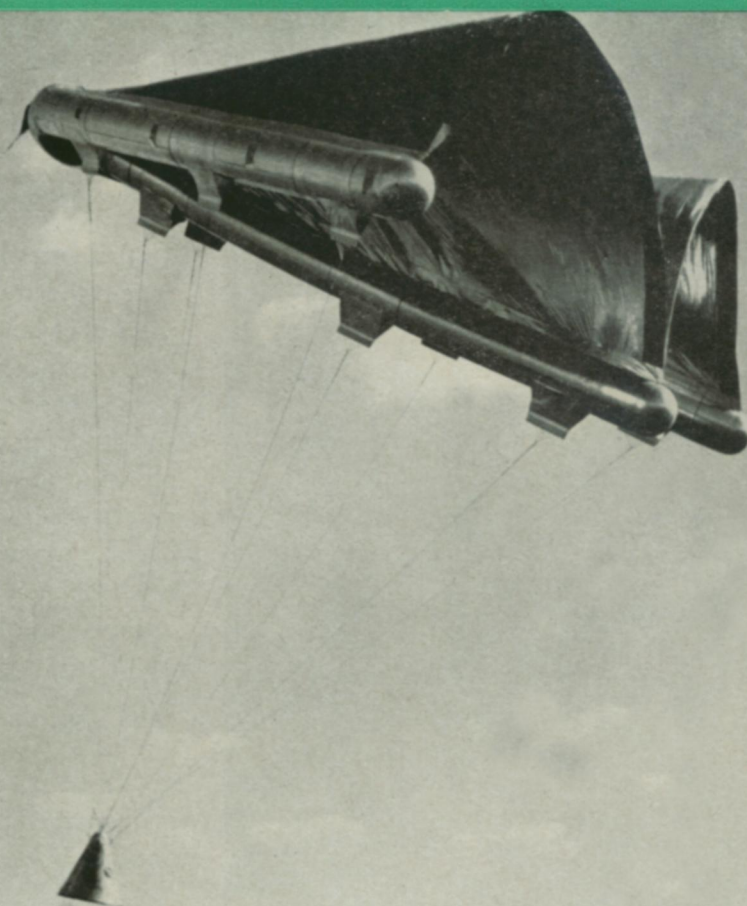
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# SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



"Wing" for Gemini

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A SCIENCE SERVICE PUBLICATION

One of a series

## An Unperturbed Picture of Plasma

Plasma . . . a hot ionized gas, the bright stuff in a neon sign, a welding arc, a lightning flash. And now being put to use by scientists around the world in research on thermionic energy conversion, thermonuclear power, and magnetohydrodynamics.

Fundamental to these studies is knowledge of the plasma's physical properties.

How hot are its electrons, ions, and smattering of atoms? (Often the temperatures are different.)

How many particles?

How distributed?

To find out, physicists at the GM Research Laboratories have blended spectroscopic methods with the latest theories of how plasma particles shape the spectral lines (both Stark and Doppler broadening). As a result they've been able to measure all ion, electron, and atom temperatures and number densities in a cesium plasma *without perturbing it*. And the variety of techniques developed (3 for electron density alone) has yielded a pleasing picture of self-consistent values.\* Another new technique, time-resolved spectroscopy, is supplying the microsecond history of plasma parameters in a spark.

These developments in plasma diagnostics are not only forwarding our research on thermionic converters . . . but are also refining our understanding of such workaday applications as electrical discharge machining and spectrochemical analysis. *Enriching the Science . . . Advancing the Technology of Tomorrow.*

## General Motors Research Laboratories

Warren, Michigan

### \*In a Cesium Diode:

Type of Measurement	Electron Number Density
Continuum	$3.6 \times 10^{15} \text{ cm}^{-3}$
Stark Broadening	$1.6 \times 10^{15} \text{ cm}^{-3}$
Series Limit	$2.1 \times 10^{15} \text{ cm}^{-3}$

From a recent paper, "Spectroscopic Measurements of Temperatures and Densities in a Cesium Plasma." Available on request.

*A noble gas plasma in a pulsed discharge thermionic converter.*

