1/20 C 35-958

CONFERENCE ON SOLAR ENERGY: THE SCIENTIFIC BASIS.

AT THE

UNIVERSITY OF ARIZONA, TUCSON.

1955 OCTOBER 31 AND NOVEMBER 1,

MONDAY AND TUESDAY.

SILICON p-n JUNCTION SOLAR ENERGY CONVERTER.

M. B. PRINCE
Bell Telephone Laboratories, Inc.
Murray Hill, New Jersey

SECTION C Business Administration Building ROOM 110

DAY Tuesday HOUR 9:30 a.m.

Introduction

Our previous speakers have described theories of p-n junction solar energy converters and have given us information as to which semiconductors should be used for these devices. In this paper we shall consider an ideal model and from this show that silicon is a suitable semiconductor for a solar energy converter. After showing that silicon solar energy converters are desirable, we will change our model to conform to actual physical conditions which include series and shunt resistances with the p-n junction. This model indicates that the shunt resistance will not cause the device to lose appreciable efficiency whereas the series resistance must certainly be made as small as possible to keep the efficiency of this device up to some decent value. This series resistance can be attributed to two sources in the diffused junction type of device; one, the thin layer of converted material on the exposed surface of the device and two, the contacts to the n and p surfaces of the semiconductor. The latter series resistance has been reduced to extremely low values and will not be included in our discussion. The series resistance of the thin surface must be compromised with the geometry of the device. Theory will be given of this compromise and of the thermal variations of these devices. In order to show that the assumed models and theories are good first approximations, measurements of actual solar energy converters will be given. At present the best units are near 11% efficient which is just about the maximum value to be expected from simple calculations.