An arc is formed between two conical metal (tungsten?) points surrounded by xenon gas in a fused-silica bulb. [See O. R. Norton, "Planetary and Atmospheric," page 75]. We suspect that the pressure in the bulb with power off and arc cold is below atmospheric. Otherwise the Spitz glassblower would have difficulty "sealing off" the bulb after filling it with xenon. Spitz describes the arc as "high pressure", the arc in the open is "fragile". Fingerprints on the bulb are undesirable because nonvolatile constituents of perspiration absorb radiation. Perhaps they absorb much radiation in the ultraviolet and thus raise the temperature of the bulb.

Star images near the horizon and near the plane of the earth tend to be faint. The "shadowed," areas (shadows of arc electrodes) on the dome are isoceles triangles several feet high. We have seen shading with every arc we have used and also in the Spitz A4 planetarium at Frostburg State College in Maryland.

In a new arc the spacing of the points is 0.009 inch (0.23 mm). Sometimes in our experience arcs have failed by bridging or shorting. Sometimes the spacing of the points has increased until the starter could not start the arc. In one case (October, 1969) a used arc with spacing 0.8 mm would barely start. The spacing of the points can be measured with a 2X microscope having a scale in the eyepiece. The arc is nominally a "20-watt" arc. (1.8 amp/12 volts) = 21.6 watts. The slope of the current-voltage curve of an arc is usually negative.

Data for an arc installed in November, 1969 are tabulated below.
Console power supply

It is recommended for times as often as the starter unit.

To perform this on times, the mean life to failure for the arc, I.e., the arc needs enough time to start the arc.

The minimum current from the power supply is sometimes not can be adjusted by bending the wires.

The gap starter contact is a spark gap consisting of two wires in air. This gap starter contacts a spark gap by the operator at the console. Inside the store globe, the sound of a spark inside the d-c from the power supply.

If the arc does not start immediately, the sound of a spark inside the arc is established, the starter contacts the arc directly across the voltage to the arc. The high voltage produces a spark between the points.

Initially, the points in the arc are cold, as soon as the power supply supplies high voltage of a spark between the points, and I in amperes.

The values of A are in volts and I in amperes.

<table>
<thead>
<tr>
<th>Voltage (V)</th>
<th>Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.5</td>
<td>14.7</td>
</tr>
<tr>
<td>18.7</td>
<td>14.9</td>
</tr>
</tbody>
</table>

After 10 hours operation

1. 0.6
2. 0.7

New arc
The power supply has a 2:1 step-down transformer with a fuse in the primary of the transformer. With the H and L pots properly adjusted, on is 3 or 4 amperes. During operation the current in the fuse is 1.3 amperes for 1.8 amperes output and 0.6 amperes for 0.6 amperes output. (Some power, of course, is dissipated in the rectifier and regulator.) A fuse of 1.5 amperes is blown immediately because of the initial surge. If the d-c output is in the normal range, a 2-ampere fuse may survive several starts. We usually use a 3.2-ampere or 4-ampere slow-blow fuse in the power-supply console. A fuse of this size may hold an hour or two and survive several starts with an output current of 7 amperes. A fuse heavy enough to survive the initial surge when the power is turned on does not necessarily blow when the arc current is excessive. It is therefore useful occasionally to insert an ammeter and measure the current to the arc.

The power supply uses semiconductor devices but no tubes. The catalogue numbers of the devices are not easy to find in handbooks and dealers' catalogues. The practice of Spitz is to exchange chassis rather than to send out a replacement semiconductor diode. This practice reduces the diagnostic effort required of the customer, but he must still realize that a particular chassis needs replacement.

A new power supply and stepper were introduced in fall of 1970. New power supply also has two
Arc, starter, and power supply

The "starts" control switches the 120-volt a-c on and off; it also varies the current output of the rectifier.

Power supply in console chassis.