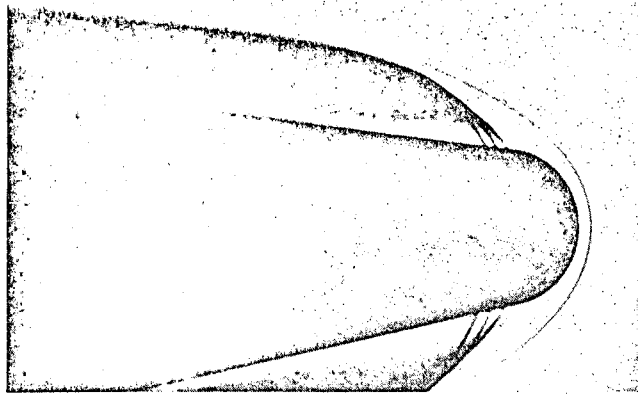
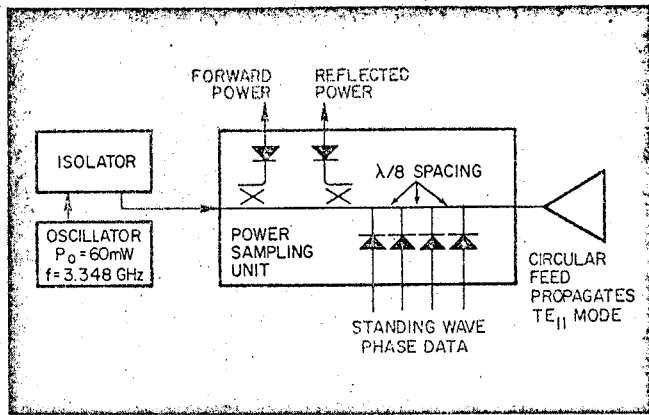


(Blackout Analysis continued)



Wind tunnel simulation shows flow paths of liquid ejected to neutralize the plasma coating.



The S-band reflectometer measures both power and phase of energy reflected from the plasma shield.

to the point of critical density in the plasma is calculated.

"An open-ended circular waveguide provides the interface between the reflectometer and the plasma shield," says Calvin Swift, who designed the version used in the most recent test. "Refinements on earlier flights gave us a good handle on the practical design of this antenna."

The effect of plasma was also recorded using electrostatic probes on board the spacecraft. Measured attenuation in telemetry signals from the spacecraft to the ground recording station also supplied supplemental data.

For tracking the path of the payload during the blackout period, a ground based radar is used. This ground unit can also see the plasma

wake trailing the craft, which provides a much larger radar cross-section for ease in tracking.

"Preliminary data indicates reduced attenuation when using both water and the electrophilic," reports Norman Akey, project manager for the RAM series. "But we will not know the relative effectiveness of the two liquids until the data is further refined."

Non-thermal radiation effects investigated

Non-thermal biological effects of microwave radiation were discussed at the Fifth International Symposium of the International Microwave Power Institute (IMPI) held in Scheveningen, The Netherlands, last month.

Among the speakers was Jack G. Christian of the U. S. Army Surgeon General's Office, who noted that recent stricter Dept. of Health, Education and Welfare Radiation regulations placed on microwave ovens—1mW/cm² leakage prior to sale and 5 mW/cm² throughout lifetime—represented an important departure from the "what you don't know won't hurt you" attitude held in the U. S.

Christian charged, "We in the United States have chosen to disregard Soviet research which has shown damage to tissues subjected to little or no heating by microwave radiation." He expressed hope that the new regulations mean a "recognition of the possibility that micro-thermal and non-thermal hazards may exist as was earlier suggested by Soviet and other European scientists."

Soviet reports that low level irradiation alters heart beat were disputed by Milton M. Zaret, M.D., director of research of the Zaret Foundation, Scarsdale, N. Y. Irradiation of a rabbit's head at 2.4 GHz cw produced changes in heart-

beat by heating and "not as a result of electrophysiological stimulation of either brain cells or peripheral neural sensors by microwaves," he said.

But just the opposite was reported by Allan H. Frey of Randomline, Inc., Willow Grove, Pa., who described experiments where frogs were irradiated by 1.2 GHz pulsed modulated energy at average power densities below 1 microwatt/cm². Heart rate decreased when rf pulses were directed at the frog during the occurrence of the ECG R wave. "Under certain exposure conditions," Frey said, "arrhythmia [disturbance of rhythm] and heart block could be induced."

Third eye gives 360 degree vision in space

Construction has started at a site near Madrid for NASA's third 210-foot antenna for deep space communications.

The Madrid antenna, together with identical facilities at Canberra, Australia, and Goldstone, Calif., will enable the United States to communicate around the clock with the deep-space spacecraft of

the future. The three station network is to be ready in 1973 for NASA's unmanned Pioneer F space flight past Jupiter.

"Gain for the 210-foot antenna is 62.5 dB at S-band," says Robert Rapp, program manager for the new antennas. This compares to about 38 dB for the 85-foot version presently used.

"The new antennas will be used primarily at S-band," Rapp continued, "but construction tolerances are close enough for use at X-band, in case future space systems go to this frequency."

Collins Radio Co., Dallas, will build the new antennas in Australia and Spain under a contract for about \$20 million.