This computer maintains collections of network, user, and conference data, and controls the conference or voice servers.

- Administrator client: This computer manages users, conferences, and the database in the administrator server.
- Payload communications manager (PAYCOM) client: This is a computer that exerts control over who talks in such restricted conferences as those that include direct communication with crewmembers of the ISS.
- Virtual public network (VPN) server: Like other VPN servers, this serves to authenticate, by use of identification numbers and encryption, the computers of remote users (in this case, conference clients) who seek access to the IVoDS.
- Telephony gateways: These are interfaces between (1) the EVoDS voice loops, which are of public switched telephone network type, and (2) the IVoDS Internet-Protocol-based conferences.

This work was done by James Chamberlain, Gerry Myers, David Clem, and Terri Speir of AZ Technology, Inc., for **Marshall Space Flight Center.** *For further information, contact Caroline Wang, MSFC Software Release Authority, at (256) 544-3887 or Caroline.K.Wang@nasa.gov. Refer to MFS-31666.*

Stripline/Microstrip Transition in Multilayer Circuit Board

Transitions like this one could be useful in microwave communication products.

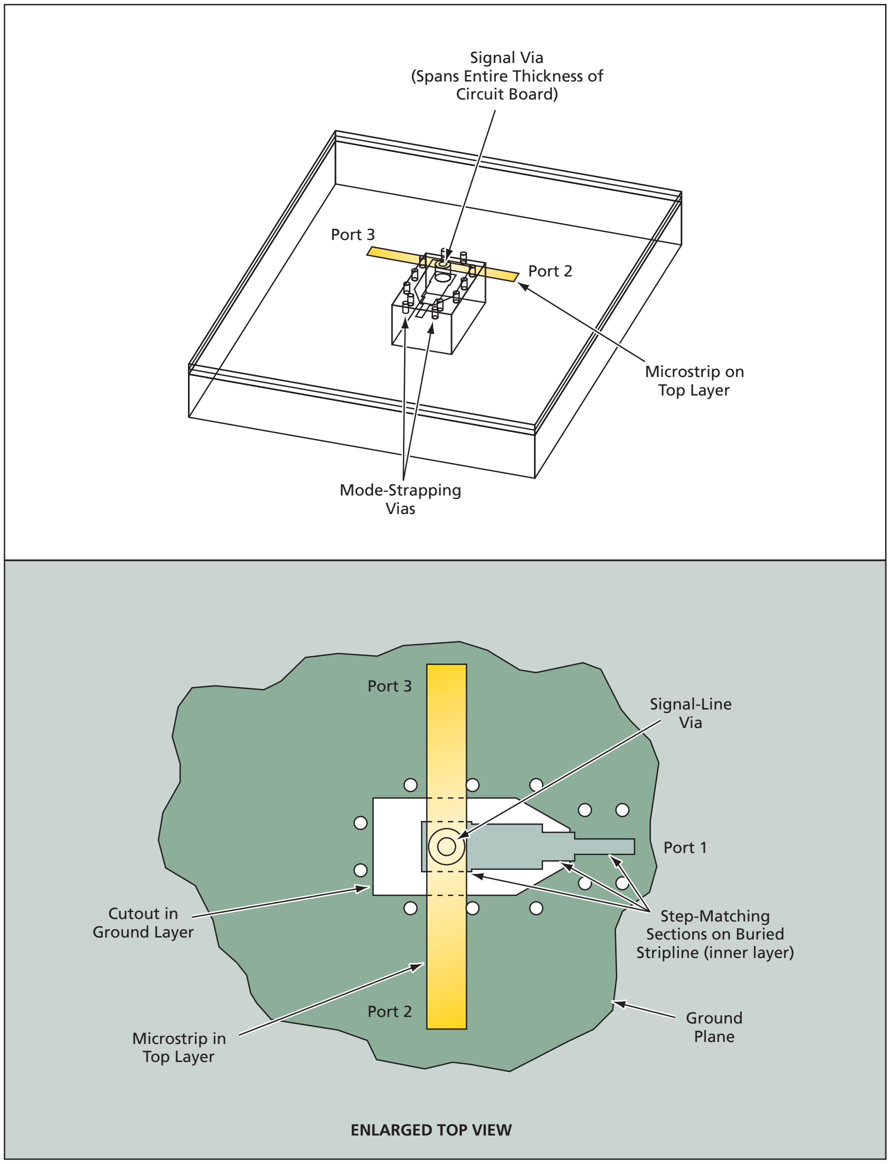
NASA's Jet Propulsion Laboratory, Pasadena, California

A stripline-to-microstrip transition has been incorporated into a multilayer circuit board that supports a distributed solid-state microwave power amplifier, for the purpose of coupling the microwave signal from a buried-layer stripline to a top-layer microstrip. The design of the transition could be adapted to multilayer circuit boards in such products as cellular telephones (for connecting between circuit-board signal lines and antennas), transmitters for Earth/satellite communication systems, and computer mother boards (if processor speeds increase into the range of tens of gigahertz).

The transition is designed to satisfy the following requirements in addition to the basic coupling requirement described above:

- The transition must traverse multiple layers, including intermediate layers that contain DC circuitry.
- The transition must work at a frequency of 32 GHz with low loss and low reflection.
- The power delivered by the transition to top-layer microstrip must be split equally in opposite directions along the microstrip. Referring to the figure, this amounts to a requirement that when power is supplied to input port 1, equal amounts of power flow through output ports 2 and 3.
- The signal-line via that is necessarily a part of such a transition must not be what is known in the art as a blind via; that is, it must span the entire thickness of the circuit board.

The lower end of the via is connected to a circular pad on the bottom (ground) layer. Electrically, this pad is a dead-end or no-connection point. The pad is surrounded by a cutout in the ground layer; the cutout includes a rec-



Built Into a Multilayer Circuit Board, the stripline-to-microstrip transition couples power from port 1 to ports 2 and 3.

tangular main portion that ends in a triangular taper at the input end.

The cutout lies above a standard rectangular cavity. The combination of the triangular-taper portion of the cutout and the rectangular cavity serves to focus the electromagnetic field to propagate up the signal-line via. The cavity also prevents coupling of the signal to neighboring circuits. The rectangular cavity can be fabricated easily by conventional machining techniques; the triangular-taper portion of the cutout is fabricated easily by printed-circuit techniques. To compensate for reflections from the transition, step-matching sections are included in the vicinity of the triangular taper.

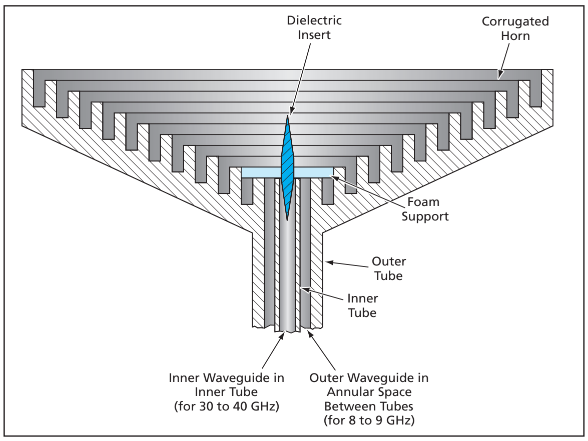
Mode-strapping vias are also included. These vias are blind; that is, they terminate at, and are connected to, an intermediate layer. These vias can be blind because they do not carry the signal. These can be closely spaced. The closeness of the spacing compensates somewhat for the unreliability of connections formed in the process of fabrication of blind vias.

This work was done by Larry Epp and Abdur Khan of Caltech for **NASA's Jet Propulsion Laboratory**. *Further information is contained in a TSP (see page 1).*
NPO-41061

Dual-Band Feed for a Microwave Reflector Antenna

Two coaxial waveguides carry radiation in two frequency bands.

NASA's Jet Propulsion Laboratory, Pasadena, California



A **Corrugated Horn and a Dielectric Rod Insert** help to shape the beams radiated from the ends of the outer and inner waveguide, respectively.

A waveguide feed has been designed to provide specified illumination patterns for a dual-reflector antenna in two wavelength bands: 8 to 9 GHz and 30 to 40 GHz. The feed (see figure) has a coaxial configuration: A wider circular tube surrounds a narrower circular tube that serves as a waveguide for the signals in the 30-to-40-GHz band. The annular space between the narrower and the wider tube serves as a coaxial waveguide for the signals in the 8-to-9-GHz band. The nominal design frequencies of the outer and inner waveguides are 8.45 and 32 GHz, respectively.

Each of the two waveguides is terminated in a component that is sized and shaped to help focus the radiation in its respective frequency band into the specified illumination pattern. For the outer waveguide, the beam-shaping termination is a corrugated horn; for the inner waveguide, the beam-shaping termination is a dielectric rod insert.

This work was done by Daniel Hoppe and Harry Reilly of Caltech for **NASA's Jet Propulsion Laboratory**. *Further information is contained in a TSP (see page 1).*
NPO-40418