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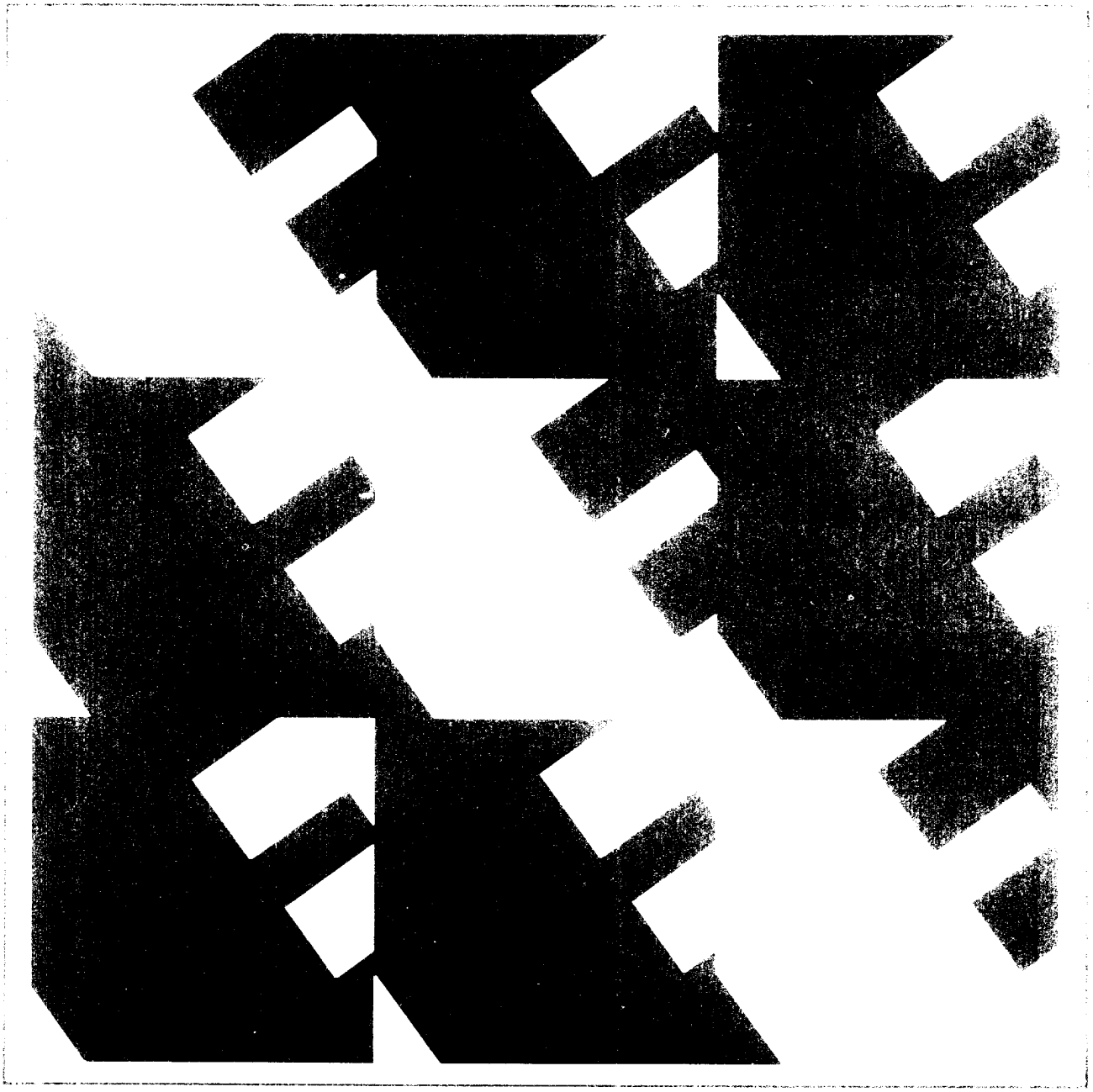
IEEE Standard Definitions of Terms for Waveguide Components



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Waveguide Standards Committee
of the
IEEE Microwave Theory and Techniques Society

Approved June 16, 1978

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Foreword

(This Foreword is not a part of IEEE Std 147-1979, Standard Definitions of Terms for Waveguide Components.)

The Waveguide Standards Committee of the Microwave Theory and Techniques Society (MTT) was formed in 1968 following direction from the IEEE to associate this work with the appropriate technical group. The committee membership was drawn partly from the original Antenna and Waveguide Standards Committee, and the work contained herein is based on the considerable effort and background provided by that committee.

This standard presents definition of components in waveguide usage. These components are considered to be linear, passive, and reciprocal unless otherwise specified in the definitions. The definitions included were drawn from the Institute of Radio Engineers document No 53 IRE 2.S1-1953, IRE Standards on Antennas and Waveguides; Definitions of Terms, No 59 IRE 2.S1-1959, IRE Standards on Antennas and Waveguides; Waveguide and Waveguide Component Measurements, International Electrotechnical Commission (IEC) documents, Technical Committee No 46, Cables, Wires, and Waveguides for Telecommunication Equipment, Waveguide Vocabulary Work, Category V, Junctions, and Category XIII, Waveguide Components and other sources. Some definitions are included unchanged, some have been modified or deleted, and several new definitions have been added.

The present list is not intended to contain all possible component varieties. For example, definitions of bends which may be mitered or curved, are contained within the definition of bend.

The members of the Subcommittee on Definitions of Waveguide Components of the IEEE Microwave Theory and Techniques Society who contributed to this standard during 1968–1975 were:

D. J. LeVine, *Chairman*

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IEEE Standard Definitions of Terms for Waveguide Components

adapter, waveguide. A structure used to interconnect two waveguides which differ in size or type. If the modes of propagation also differ, the adapter functions as a mode transducer.

attenuator, waveguide. A waveguide component that reduces the output power relative to the input by any means, including absorption and reflection.

barretter. A form of bolometer element having a positive temperature coefficient of resistivity which typically employs a power-absorbing wire or thin metal film.

bend, waveguide. A section of waveguide or transmission line in which the direction of the longitudinal axis is changed. In common usage the waveguide corner formed by an abrupt change in direction is considered to be a bend.

bolometer (bolometer unit, bolometric instrument). A term commonly used to denote the combination of a bolometer element and a bolometer mount; sometimes used imprecisely to refer to a bolometer element.

bolometer element (bolometric detector). A power-absorbing element which uses the resistance change related to the temperature coefficient of resistivity (either positive or negative) as a means of measuring or detecting the power absorbed by the element. (See **barretter, thermistor.**)

bolometer mount. A waveguide or transmission-line termination that can house a bolometer element.

calorimeter, waveguide. A waveguide or transmission-line structure which uses the temperature rise in a medium as a measure of absorbed power. The medium, typically water or a thermoelectric element, is either the power-absorbing agent or has heat transferred to it from a power-absorbing element.

cavity resonator. A resonator formed by a volume of propagating medium bounded by reflecting surfaces. (See also **resonator, waveguide.**)

choke joint (choke coupling). A connection designed for essentially complete transfer of power between two waveguides without metallic contact between the inner walls of the waveguides. It typically consists of one cover flange and one choke flange.

contact joint (contact coupling). A connection designed for essentially complete transfer of power between two waveguides by means of metallic contact between the inner walls of the waveguides. It typically consists of two contact flanges.

corner, waveguide. See **bend, waveguide.**

coupling aperture (coupling hole, coupling slot). An aperture in the bounding surface of a cavity resonator, waveguide, transmission line, or waveguide component, which permits the flow of energy to or from an external circuit.

coupling loop. A conducting loop which permits the flow of energy between a cavity resonator, waveguide, transmission line, or waveguide component and an external circuit.

coupling probe. A probe which permits the flow of energy between a cavity resonator, waveguide, transmission line, or waveguide component and an external circuit.

directional coupler. A four-port junction consisting of two waveguides coupled together in

such a manner that a single traveling wave in either guide will induce a single traveling wave in the other, the direction of the latter wave being determined by the direction of the former.

E–H tee. A junction composed of E– and H–plane tee junctions wherein the axes of the arms intersect at a common point in the main guide.

NOTE: Compare **hybrid tee.**

E–H tuner. An E–H tee having E and H arms terminated in movable open- or short-circuit terminations.

E–plane bend (corner). A waveguide bend (corner) in which the longitudinal axis of the guide remains in a plane parallel to the electric field vector throughout the bend (corner).

E–plane tee junction (series tee). A waveguide tee junction in which the electric field vector of the dominant mode in each arm is parallel to the plane of the longitudinal axes of the guides.

flange, choke. A flange designed with auxiliary transmission-line elements to form a choke joint when used with a cover flange.

flange, contact. A flat flange used in conjunction with another flat flange to provide a contact joint.

flange, cover. A flat flange used in conjunction with a choke flange to provide a choke joint.

flange, flat. See **flange, cover.**

flange, plane. See **flange, cover.**

flexible waveguide. A waveguide constructed to permit limited bending, twisting, stretching, or any combination thereof, without appreciable change in its electrical properties.

frequency meter, cavity resonator. A cavity resonator used to determine frequency. (See also **cavity resonator.**)

gasket, waveguide. A resilient insert usually between flanges intended to serve one or more of the following primary purposes: (1) to reduce gas leakage affecting internal waveguide pressure, (2) to prevent instrusion of foreign material into the waveguide, or (3) to reduce power leakage and arcing.

H–plane bend (corner). A waveguide bend (corner) in which the longitudinal axis of the guide remains in a plane parallel to the plane of the magnetic field vectors throughout the bend (corner).

H–plane tee junction (shunt tee). A waveguide tee junction in which the magnetic field vectors of the dominant mode in all arms are parallel to the plane containing the longitudinal axes of the arms.

hybrid junction. A waveguide or transmission-line arrangement with four ports which, when the ports have reflectionless terminations, has the property that energy entering any one port is transferred (usually equally) to two of the remaining three.

hybrid tee (magic tee). A hybrid junction composed of an E–H tee with internal matching elements, which is reflectionless for a wave propagating into the junction from one port when the other three ports have reflectionless terminations.

iris, waveguide. A partial obstruction at a transverse cross-section formed by one or more metal plates of small thickness compared with the wavelength.

launcher. An adapter used to provide a waveguide or transmission-line port for a wave-propagating structure.

line stretcher. A section of waveguide or transmission line having an adjustable physical length.

magic tee. See **hybrid tee.**

matched termination, waveguide. See **termination, matched.**

mode filter. A device designed to pass energy along a waveguide in one or more selected modes of propagation, and substantially to reject energy carried in other modes.

mode transducer. A device for transforming an electromagnetic wave from one mode of propagation to another.

mode transformer. See **mode transducer.**

phase shifter, waveguide. An essentially lossless device for adjusting the phase of a forward-traveling electromagnetic wave at the output of the device relative to the phase at the input.

plunger, waveguide. See **short circuit, adjustable.**

post, waveguide. A cylindrical rod placed in a transverse plane of the waveguide and behaving substantially as a shunt susceptance.

quadrature hybrid. A hybrid junction which has the property that a wave leaving one output port is in phase quadrature with the wave leaving the other output port.

resonant iris. An iris designed to have equal capacitive and inductive susceptances at the resonant frequency.

resonator, waveguide. A waveguide or transmission-line structure which can store oscillating electromagnetic energy for time periods that are long compared with the period of the resonant frequency, at or near the resonant frequency.

rotary joint. A coupling for efficient transmission of electromagnetic energy between two waveguide or transmission-line structures designed to permit unlimited mechanical rotation of one structure.

series tee junction. See ***E*- plane tee junction.**

short circuit, adjustable, waveguide. A longitudinally movable obstacle which reflects essentially all the incident energy.

shunt tee junction. See ***H*- plane tee junction.**

slide screw tuner. A waveguide or transmission-line tuner employing a post of adjustable penetration, adjustable in position along the longitudinal axis of the waveguide.

step twist, waveguide. A waveguide twist formed by abruptly rotating about the waveguide longitudinal axis one or more waveguide sections, each nominally a quarter wavelength long.

stub, waveguide. A section of waveguide or transmission line joined to the main guide or transmission line and containing an essentially nondissipative termination.

taper, waveguide. A section of tapered waveguide.

tapered waveguide. A waveguide or transmission line in which a physical or electrical characteristic changes progressively with distance along the axis of the guide.

tee junction. A junction of waveguides or transmission lines in which the longitudinal guide axes form a tee.

termination. A one-port load in a waveguide or transmission line.

termination, matched. A termination matched with regard to the impedance in a prescribed way; for example, (A) a reflectionless termination or (B) a conjugate termination.

thermistor. A form of bolometer element having a negative temperature coefficient of resistivity which typically employs a semiconductor bead.

transformer, waveguide. A structure added to a waveguide or transmission line for the purpose of impedance transformation.

tuner, waveguide. An adjustable waveguide transformer.

twist, waveguide. A waveguide section in which there is progressive rotation of the cross-section about the longitudinal axis. (See also **step twist.**)

uniform waveguide. A waveguide or transmission line in which the physical and electrical characteristics do not change with distance along the axis of the guide.

waveguide gasket. See **gasket, waveguide.**

wavemeter. See **frequency meter, cavity resonator.**

window, waveguide. A gas- or liquid-tight barrier or cover designed to be essentially transparent to the transmission of electromagnetic waves.

wye junction. A junction of waveguides or transmission lines in which the longitudinal guide axes form a Y.

Y junction. See **wye junction.**