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PRINTED WIRING

TERMS AND DEFINITIONS

The following terms and definitions were originated as a necessary tool to the more specific tasks of Engineering Committee 40C in formulating standards for printed wiring, and are offered in this form as a convenience for others who may find it useful. Comments on the content of this bulletin may be directed to Committee 40C through the RETMA Engineering Office. After coordination within the Engineering Department this material will be submitted to the IRE for incorporation in their definitions activity.

ENGINEERING DEPARTMENT

RADIO-ELECTRONICS-TELEVISION MANUFACTURERS ASSOCIATION

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DEFINITIONS AS OF AUG. 15, 1955

RETMA COMMITTEE 40C

Printed Wiring Task Group I

The original objective of Task Gr. I, Committee 40C, was to define terms associated with "Printed Wiring". It was soon apparent that certain components, circuits and assemblies were so intimately associated that the scope of definitions was accordingly broadened. It also became apparent that many terms were equally within the scope of RETMA Committee 33-C on "Ceramic Based Printed Circuits", and in many cases were common to both groups. It has been the intent of this Committee to define such terms sufficiently broadly to cover the needs of all types of printed circuits.

It has been further pointed out that printed circuits involving printed patterns of dielectric, magnetic, or semiconductive materials as well as the more common conductive materials have been, or can be made, and probably will be more prevalent in the future. A number of terms have been broadened in scope to encompass such circuits.

It further became apparent that certain terms had gained widespread usage, with sometimes vague or varied meanings. Rather than attempting to reduce such terms to logical, orderly definitions, changing some of the meanings in current usage, the Committee has attempted to retain these terms in a broad generic sense, and add specific terms to cover variations included within them.

TERM	DEFINITION	REASONING
PRINTED	Reproduced on a surface by any process.	A condensed version of the general definition particularly suited to this field.
* PRINTED CIRCUIT	A pattern comprising components, wiring, or a combination thereof, all formed in a predetermined design on the surface or surfaces of a common base.	Printed Circuit is intended to be a generic term, including all other more specific types of printed devices. The essence of Printed Circuits is the formation of a pattern on a surface in an accurately repeatable manner. The exceptions to this are of no practical significance. Although most patterns which are printed are conductive, it is quite feasible to print non-conductive patterns for such purposes as dielectrics for capacitors, "cores" for inductances, etc. This definition is intended to encompass printed patterns of dielectric & magnetic materials as well as conductive patterns.
* PRINTED COMPONENT	A type of printed circuit intended primarily to provide an electrical and/or magnetic function other than point to point connections, or shielding, e.g. printed inductors, printed resistor, printed capacitor, printed transmission line, etc.	A subdivision of printed circuits. An individual printed component may be a printed resistor, printed switch, etc. Printed components, plural, may include all one type or several types such as printed resistors, printed capacitors, and printed inductors. Shielding is classified with point to point wiring since in both cases conductivity is the most important characteristic and since in most applications printed shielding and printed wiring will be combined where the former replaces the conventional ground plane of a metal chassis.
PRINTED WIRING	A type of printed circuit intended primarily to provide point to point electrical connections or shielding.	Although wiring may be considered merely another type of component, techniques and applications of printed wiring differ so much from other types of printed components and the term has become so widely used that the inclusion of a specific term is indicated. See discussion of Printed Component concerning shielding.

* PRINTED CIRCUIT BOARD	An individual separate printed circuit on a base, completely processed as far as the printed portion is concerned. Also called CARD, CHASSIS or PLATE.	This is a printed unit which has been completed as far as etching or plating of wiring, curing and adjustment of resistors, etc. If it was processed as one of many units in a large sheet, it has been cut out. It does not necessarily include any pierced holes unless they are an integral part of the printing process. The term is intended to be generic and include those boards having only wiring, only components, or both wiring and components. It is necessary to define Card, Chassis and Plate since they are in common usage, but their use should be depreciated.
* PRINTED COMPONENT BOARD	An individual separate printed component pattern on a base completely processed as far as the printed portion is concerned. Also called CARD, CHASSIS, or PLATE.	The stage of completion of the unit is that indicated under Printed Circuit Board. A Printed Component Board is a type of Printed Circuit board consisting principally of printed wiring as terminations.
PRINTED WIRING BOARD	An individual separate printed wiring pattern on the insulating base completely processed as far as the printed portion is concerned. Also called CARD, CHASSIS or PLATE.	The stage of completion of the unit is that indicated under Printed Circuit Board. A printed wiring board is a type of printed circuit board consisting almost entirely of point to point connectors and shielding.
PRINTED CIRCUIT ASSEMBLY	A printed circuit board on which separable components have been added.	This is the assembled condition wherein parts such as conventional resistors, capacitors, terminals, or hardware have been added to the printed circuit board. The word "separable" distinguishes between the addition of removable parts, and those such as tape resistors, or certain capacitors on ceramic based printed circuits which become essentially integral with the rest of the printed circuit.

		The term is intended to be generic and include assemblies having only printed wiring, only printed components or both printed components and wiring.
PRINTED COMPONENT ASSEMBLY	A printed component board on which separable components have been added.	A subdivision of Printed Circuit Assembly involving a printed component board and other parts.
PRINTED WIRING ASSEMBLY	A printed wiring board on which separable components have been added.	A subdivision of Printed Circuit Assembly involving a printed wiring board and other parts.
METAL CLAD BASE MATERIAL	A laminate which consists of metallic material bonded to one or both surfaces of an insulating base.	This term defines the material used in a "removal" process, such as etching. The term is intended to be broad enough to include any type of metallizing process such as plating, chemical deposition, or vapor deposition, as well as foil.
NATURAL CONDUCTIVE MATERIAL	A material having essentially the same electrical and mechanical characteristics as the material in its elementary or alloyed form.	This term defines the conductive material used in such processes as etched foil, stamped foil, embossed foil, and plated printed circuit methods, in which the properties of the material are as listed in Physical and Chemical Tables.
RECONSTITUTED CONDUCTIVE MATERIAL	A conductive material formed from finely divided particles.	This term defines the conductive material resulting from processes such as painting and pressed powder techniques and for a printed resistor where the final characteristics tend to be different from the physical and chemical tabulation of properties. The distinction of different properties from Natural Conductive Materials was originally included in the definition, but deleted on the ground that some processes using reconstituted materials may produce conductors having substantially the properties of natural materials.
BASE	The portion of a printed circuit board used to support the printed pattern.	This refers to the mechanical supporting medium; for example: The paper base phenolic laminate frequently used in phenolic base circuit, or the ceramic body in a ceramic based printed circuit.

CONDUCTIVE PATTERN	A design formed of any conductive material.	This term defines any conductive pattern, including printed resistors and "in process" patterns, such as a very thin pattern obtained by chemical deposition and requiring additional operation to arrive at a usable condition as a printed circuit.
CONDUCTOR PATTERN	A conductive pattern having low electrical resistance.	This term was originally defined in terms of a "conductive pattern in the final form in which it is used", and was intended to define the result of a multi-step process, such as electroplating on a chemically deposited start pattern. The terminology "in the final form" was deleted to avoid confusion in cases such as added protection or wear resistant electroplated finishes to an otherwise complete circuit.
* CHEMICALLY DEPOSITED PRINTED CIRCUIT	A type of printed circuit formed on a base by the reaction of chemicals in the absence of an applied electrical field.	This term has been broadened from its original sense to include dielectric or magnetic circuits as well as conductive circuits. It is intended to be broad enough to encompass all forms of chemical deposition except those involving applied electrical fields.
* ETCHED PRINTED CIRCUIT	A type of printed circuit formed by chemical, or chemical & electrolytic removal of the unwanted portion of a layer of material bonded to a base.	This term has been broadened to include dielectric & magnetic circuits, as well as conductive circuits formed by any etching process.
EMBOSSED FOIL PRINTED CIRCUIT	A type of printed circuit formed by indenting a metal foil into the insulating base and mechanically removing the unwanted raised (embossed) portions.	The Committee feels that "Embossed Foil" is somewhat a misnomer, but continues its use because of commercial history and publications so using the term. The original definition read, "---- formed by indenting a metal foil -- and mechanically removing the remaining unwanted elevated portions". This was reworded to bring in the terms "raised" and "embossed" as being more directly associated with the term being defined.

* FLUSH PRINTED CIRCUIT	A type of printed circuit in which the outer surface of the reproduced pattern is at the same elevation as the outer surface of the base.	This term has been broadened to include conductive, dielectric & magnetic circuits. The original definition had the surfaces of the pattern and the base "in the same plane". This was changed to "at the same elevation", to make the term more general, e.g. to cover patterns on cylindrical surfaces.
* PAINTED PRINTED CIRCUIT	A type of printed circuit formed by application of a material in the form of a liquid or of particles suspended in a liquid vehicle.	This term has been broadened to include conductive, dielectric and magnetic circuits. It is a generic term covering such techniques as spraying, silk screen application, offset printing, where a liquid material is handled.
* PLATED PRINTED CIRCUIT	A type of printed circuit formed by electroplating, or by electrophoretic deposition.	Originally defined in terms of conductive circuits only. Now broadened to cover dielectric or magnetic materials. The word "electrodeposition" used originally was replaced with the synonomous term "electroplating" as being more readily identifiable with the term being defined.
* PRESSED POWDER PRINTED CIRCUIT	A type of printed circuit formed from particles by application of pressure, or heat and pressure.	Originally confined to conductive particles. Now broadened in scope.
* SPRAYED PRINTED CIRCUIT	A type of printed circuit formed by spraying particles of molten material.	Originally termed "Sprayed Metal Printed Circuit". Now broadened to include other materials.
* STAMPED PRINTED CIRCUIT	A type of printed circuit formed by die stamping of foil or film.	Originally confined to stamped metal foil. Now broadened to include any foil or film.
* TRANSFERRED PRINTED CIRCUIT	A type of printed circuit in which the pattern is formed on a temporary base, and transferred to the permanent base.	This refers to a process where the printed circuit pattern is, for example, plated, etched, or stamped on any processing carrier, and then transferred and fixed in position on its final base.

* VAPOR DEPOSITED PRINTED CIRCUIT	A type of printed circuit formed by condensation of a material from its gaseous state.	A number of vacuum deposition methods, or other vapor metal techniques, using masks or some other means for arriving at a type of printed circuit have been developed. This definition covers all those in that category.
* BOND STRENGTH	A measure of the force required to separate a layer of material from an adjoining surface.	Any layer of any material can be removed from an adjoining surface if sufficient mechanical force is exerted on it. Bond strength defines the amount of such force.
CURRENT CARRYING CAPACITY	The maximum current which can be continuously carried without causing permanent deterioration of electrical or mechanical properties of the printed circuit board.	Any conductor has limitations on its current carrying capacities. If too much current is passed through it, internal heating causes the conductor to melt or the conductor to pull away from the base due to deterioration of the adhesive. Heat may also result in deterioration of electrical properties.
FEED-THRU	A conductor which connects patterns on opposite sides of a printed circuit board.	In order to cross printed wiring over from one side of a base to the other, devices called "Feed-throughs" are sometimes employed. This is a conductor which connects the opposite sides of a printed circuit board with no other purpose in mind than that of being a conductor.
MASTER DRAWING	A scaled pattern for use in producing printed circuits by any process. Also called ART WORK or PHOTO-MASTER.	For example - The scaled drawing from which the photographic negative, silk screen, stencil or die for the applicable process is made.
LAND	A portion of a printed circuit for the attachment of separate circuit elements. Also called PAD, SPOT, or TERMINAL point.	

REGISTER	A measure of the relative positions of one or more printed circuit patterns or portions thereof with respect to their desired locations on a printed circuit board or to another pattern on the opposite side of the board.
SOLDERABILITY	The ability of a printed circuit to be wet by solder.

Register may refer to the position of a part or all of a printed circuit with respect to any given reference location on a single sided arrangement, or to the alignment and relative location of the two circuits on opposite sides of a double sided arrangement.

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