Patent Abstracts

These Patent Abstracts of recently issued patents are intended to provide the minimum information necessary for readers to determine if they are interested in examining the patent in more detail. Complete copies of patents are available for a small fee by writing: U.S. Patent and Trademark Office, Box 9, Washington, DC 20231.

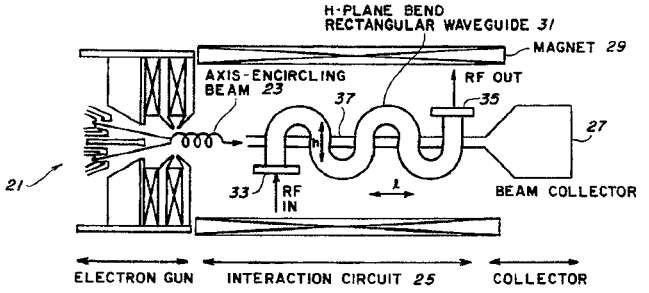
5,422,596 June 6, 1995

High Power, Broadband Folded Waveguide Gyrotron-Traveling-Wave-Amplifier

Inventors: Carter M. Armstrong, Jin J. Choi, and Achintya K. Ganguly.
Assignee: The United States of America as represented by the Secretary of the Navy.
Filed: June 30, 1994.

Abstract—A folded waveguide gyrotron-traveling-wave-amplifier comprises: an electron gun for transmitting an axis-encircling beam of electrons with large transverse energy along a first path having an axis; an RF source for producing and applying in a second path an RF input millimeter-wave signal having a bandwidth in a preselected frequency domain and having a transverse electric field; a source for generating a solenoid magnetic field parallel to the axis along the first path; a beam collector; and an interaction circuit such as an H-plane bend serpentine waveguide positioned within the solenoid magnetic field and having a narrow wall containing a beam tunnel hole for passing the axis-encircling beam of electrons therethrough to the beam collector, an output end, an input end for receiving and passing the RF input millimeter wave signal though the H-plane bend serpentine waveguide to the output end to modulate the axis-encircling electron beam, and the modulated axis-encircling electron beam amplifying the RF input signal and broadening the instantaneous bandwidth of the amplified RF input signal through the negative mass instability in the fundamental forward space harmonic of both fast and slow wave regions in the preselected frequency domain. In a second embodiment, a double-ridge TE-folded waveguide is used in place of the H-plane bend serpentine waveguide. In a third embodiment, there is no RF input signal and the interaction circuit generates an RF signal that is outputted from one of the input and output ends.

21 Claims, 8 Drawing Sheets



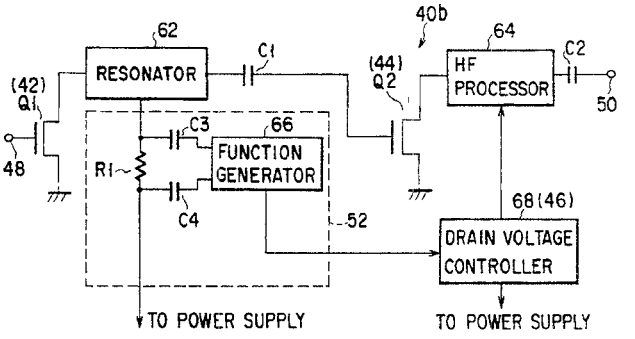
5,422,598 June 6, 1995

High-Frequency Power Amplifier Device with Drain-Control Linearizer Circuitry

Inventors: Tadahiko Maeda, Koji Iino, Shuichi Obayashi, and Syuuichi Sekine.
Assignee: Kabushiki Kaisha Toshiba.
Filed: Dec. 28, 1993.

Abstract—A two-stage power amplifier device for use in a digital hand-held radiophone includes a first and a second amplifier circuit. The first amplifier is an exciter-stage amplifier for receiving a high-frequency input signal corresponding to a modulation signal to generate an amplified signal at its output. The second amplifier is a final-stage amplifier connected to either the input signal or the output of the exciter amplifier. A detector circuit is connected to the exciter amplifier for monitoring variations in a bias current to be fed to the exciter amplifier and for generating a detection signal indicative of the current variation thus detected. A linearizer circuit is connected to the detector and the final-stage amplifier. The linearizer is responsive to the detection signal for forcing a bias voltage given to the final-stage amplifier to vary in potential while causing the bias voltage to remain in a univocally determinable relationship with a waveform of said input signal to thereby increase the linearity of the final-stage amplifier.

19 Claims, 15 Drawing Sheets



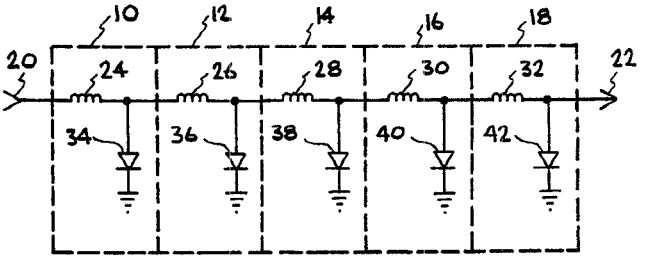
5,422,607 June 6, 1995

Linear Phase Compressive Filter

Inventor: Thomas E. McEwan.
Assignee: The Regents of the University of California.
Filed: Feb. 9, 1994.

Abstract—A phase linear filter for soliton suppression is in the form of a laddered series of stages of noncommensurate low-pass filters with each low-pass filter having a series coupled inductance (L) and a reverse-biased, voltage-dependent varactor diode to ground that acts as a variable capacitance (C). L and C values are set to levels that correspond to a linear or conventional phase linear filter. Inductance is mapped directly from that of an equivalent nonlinear transmission line and capacitance is mapped from the linear case using a large signal equivalent of a nonlinear transmission line.

11 Claims, 1 Drawing Sheet



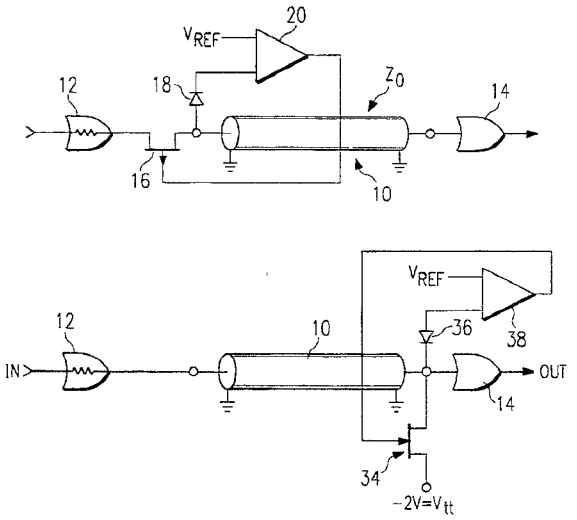
5,422,608 June 6, 1995

Adaptive Transmission Line Termination

Inventor: Louis Y. Levesque.
Assignee: Texas Instruments Incorporated.
Filed: Aug. 30, 1994.

Abstract—An adaptive transmission line termination that includes a variable voltage controlled resistor (16) connected either in series with the sending end of transmission line (10) or in parallel with the receiving end of line (10). The resistance of resistor (16) is varied in dependence upon the half voltage appearing on line (10) in order to match the characteristic impedance of line (10) for the series or source termination case. In the parallel termination case, the resistance of resistor (34) is varied in dependence upon the voltage appearing at the input of gate (14) to match the characteristic impedance of line (10).

20 Claims, 2 Drawing Sheets



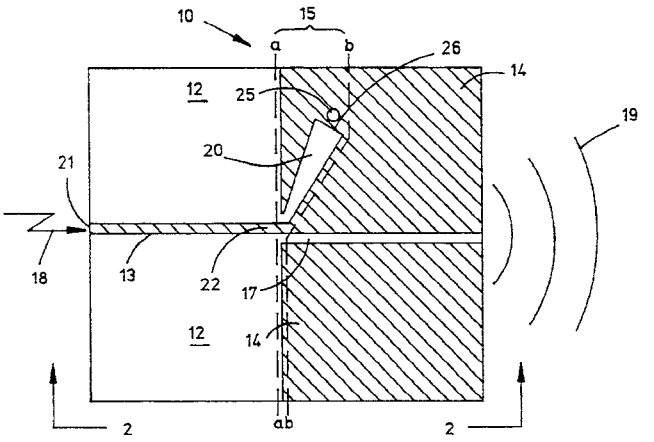
5,422,609 June 6, 1995

Uniplanar Microstrip to Slotline Transition

Inventors: Thinh Q. Ho and Stephen M. Hart.
Assignee: The United States of America as represented by the Secretary of the Navy.
Filed: June 17, 1994.

Abstract—A uniplanar microstrip to slotline transition is provided that includes a substrate having opposed first and second sides. A first electrically conductive layer is joined to the first side of the insulating substrate, and a second electrically conductive layer is joined to the second side of the substrate. The second layer is configured to provide a microstrip, a microstrip transmission mode to slotline transmission mode transition having a matching element, and a slotline.

12 Claims, 4 Drawing Sheets



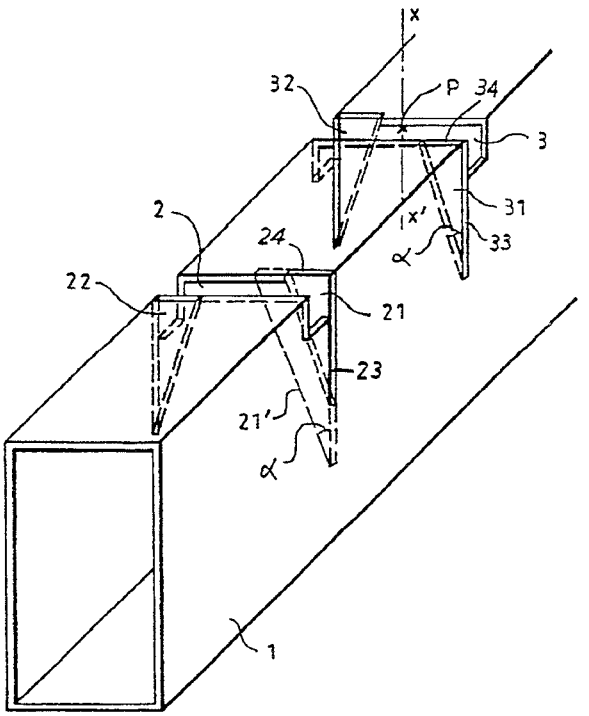
5,422,652 June 6, 1995

Waveguide with Noninclined Radiating Slots Excited by Flat Metal Plates

Inventors: Daniel Caer and Jean Le Foll.
Assignee: Thomson-CSF.
Filed: Dec. 15, 1992.

Abstract—In a waveguide (**1**) having slots (**2**, **3**) perpendicular to the axis of the waveguide, cut out in a narrow wall of the waveguide, there are positioned, on each side of each slot, pairs of metal flat plates (**21**, **22**; **31**, **32**) symmetrical with respect to the central axis of the slot. These flat plates modify the electrical field at the associated slot and make it possible to excite it, the value of the coupling being set by the adjusting of the size of the flat plates and of their position with respect to the corresponding radiating slot.

5 Claims, 1 Drawing Sheet



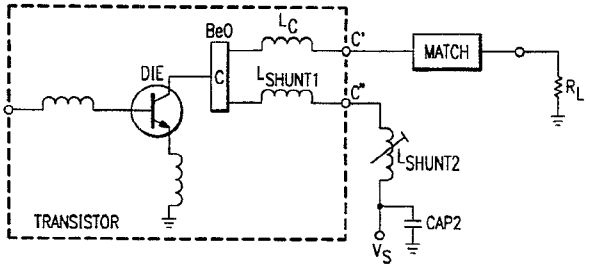
5,424,676 June 13, 1995

Transistor Collector Structure for Improved Matching and Chokeless Power Supply Connection

Inventor: Henry Z. Liwinski.
Assignee: SGS-Thomson Microelectronics, Inc.
Filed: Jan. 29, 1993.

***Abstract*—Internal to the transistor, an additional, direct connection is made from the internal collector to the external collector of the transistor by a fixed shunt inductance. The external power supply V_s is applied to the transistor collector though an adjustable external shunt element. The adjustable external shunt element allows the user to finetune the impedance matching circuit such that the transformation ratio of the output matching circuitry is minimized.**

13 Claims, 1 Drawing Sheet



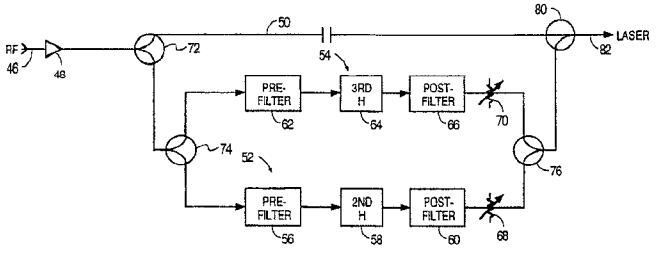
5,424,680 June 13, 1995

Predistorter for High-Frequency Optical Communications Devices

Inventors: Moshe Nazarathy, Charles H. Gall, and Chien-Yu Kuo.
Assignee: Harmonic Lightwaves, Inc.
Filed: Nov. 30, 1993.

***Abstract*—A generalized frequency-dependent predistortion circuit for nonlinear optic devices such as semiconductor lasers and light emitting diodes includes a pre-filter and post-filter associated with a linearizer (distorter). A multichannel sub-carrier electrical signal is input to a splitter that provides—on a primary path—a signal to a time delay, and hence to a coupler, to the secondary paths. In the first secondary path, a pre-filter provides a signal to a second-order distorter. This signal is then subject to a post-filter and then to a variable attenuator. In the second secondary path, a third-order distorter again has an associated pre-filter and post-filter with a variable attenuator downstream of the post-filter. The variable attenuators in each path provide frequency-independent attenuation. In one version, the distorters in both paths are nonlinear diode circuits. The second secondary path provides very low fundamental leakthrough. The pre- and post-filters are of similar design with differing component values, each filter being an integral equalizing filter that arbitrarily manipulates phase and amplitude in a frequency-dependent fashion. Each is a synthesized filter tuned or built to a specific complex frequency-dependent profile to linearize a particular individual laser unit.**

16 Claims, 14 Drawing Sheets



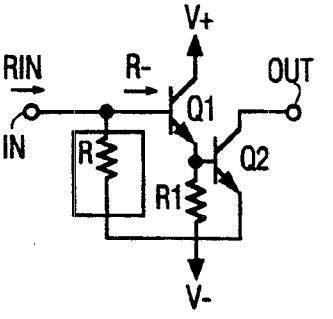
5,424,686 June 13, 1995

Negative-Resistance-Compensated Microwave Buffer

Inventors: Stephen L. Wong and Jose M. Garcia.
Assignee: Philips Electronics North America Corporation.
Filed: Apr. 20, 1994.

***Abstract*—A monolithic microwave buffer amplifier is adapted to increase its input impedance at microwave frequencies. Capacitive reactances in first and second stages of the buffer amplifier appear collectively at the input of the first stage as a negative resistance. Compensating positive resistance is electrically connected to the input of the first stage to cancel the negative resistance and provide a sufficiently high resistive input impedance.**

19 Claims, 4 Drawing Sheets



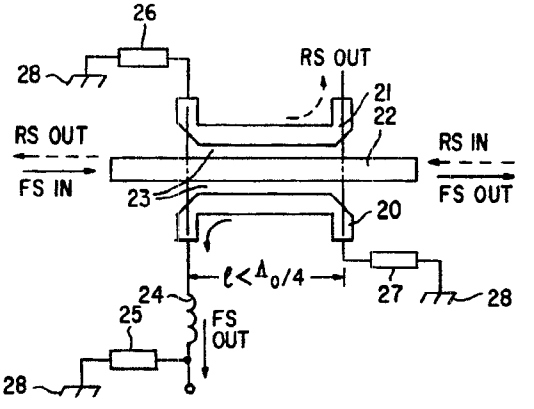
5,424,694 June 13, 1995

Miniature Directional Coupler

Inventors: Leo Maloratsky and John Ide.
Assignee: AlliedSignal Inc.
Filed: June 30, 1994.

***Abstract*—A miniature directional coupler has short coupled lines, a series inductor, and a parallel resistor connected to the second coupled line output. The coupled lines have a length considerably less than one quarter of a wavelength. Values of the series inductor and the parallel resistor are dependent on coupling, frequency, directivity, impedance and coupling flatness.**

17 Claims, 3 Drawing Sheets



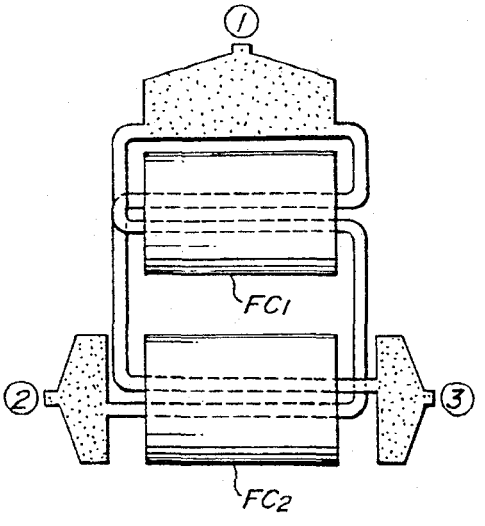
5,424,695 June 13, 1995

Ultra-Wide Frequency Range Constant Phase Difference Power Distributor

Inventor: Yoshihiro Konishi.
Assignee: Uniden Corporation.
Filed: Oct. 13, 1993.

Abstract—To avoid deterioration of isolation between two distributed power outputs in higher- and lower-end portions of an available frequency region of a Wilkinson power distributor, plural stages of ferrite-loaded, close-coupled parallel dual lines for providing a Wilkinson power distributor—an electric length of which lines is shortened within a range in which desired isolation can be obtained, are connected in cascade. As a result, two distributed power outputs having a constant phase difference with sufficient isolation throughout an extremely wide frequency range can be obtained.

3 Claims, 8 Drawing Sheets



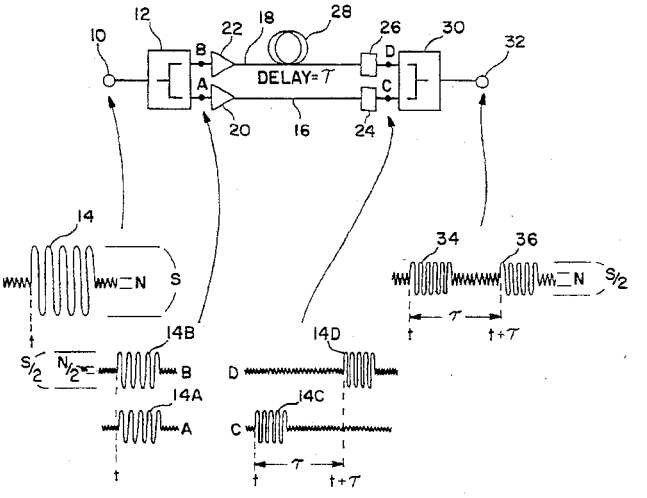
5,426,433 June 20, 1995

Coherent RF Pulse Multiplier

Inventor: Eitan Gertel.
Assignee: AEL Industries, Inc.
Filed: Sept. 14, 1993.

Abstract—A radio frequency pulse multiplier for producing coherent multiples of radio frequency (rf) pulses comprising an input terminal for receiving rf pulses, a signal divider for providing a plurality of pulses in response to an input pulse, the output of the signal divider coupled to a plurality of signal paths, each respective path comprising a time delay element providing a selectable delay to a respective pulse, a signal combiner for combining the plurality of pulses on a single output, and an output terminal. The output of the multiplier comprises pulses delayed by amounts equal to the preselected delays in the respective signal paths of the multiplier. The multiplier may comprise signal conditioning elements for conditioning the rf pulses within the multiplier. In another embodiment of the invention, a plurality of the pulse multiplier may be arranged in a cascade, whereby the cascade produces a number of pulses that is the arithmetic product of the number of pulses produced in the respective stages of the cascade. The multiplier may further embody a notch filter for substantially rejecting an rf pulse train of frequency f by selecting the time delay equal to the period 1/f of the input pulse frequency.

12 Claims, 2 Drawing Sheets



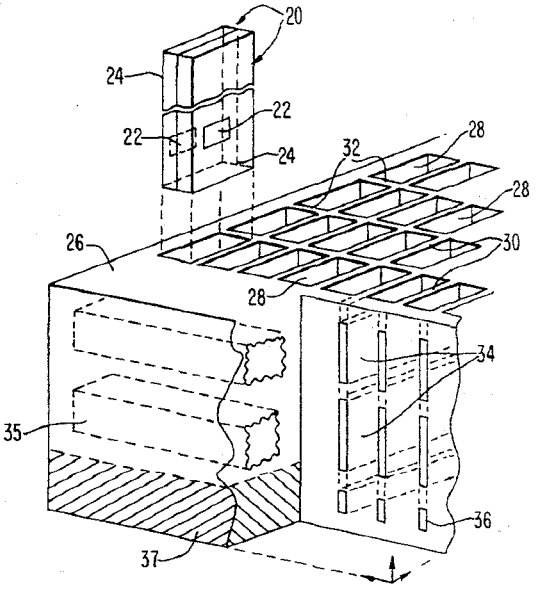
5,426,437 June 20, 1995

Optical Data Distribution System for Phased-Array Antenna

Inventors: Michael A. Cross and John R. Linkowski.
Assignee: Westinghouse Electric Corporation.
Filed: May 9, 1991.

Abstract—An optical data distribution system for densely packed transmitter/receiver modules of a phased-array antenna, which includes an optical source and a plurality of light bars for distributing the optical energy to the photoconductor of each respective transmitter/receiver module. Each bifurcated light bar has an entrance aperture coupled to the optical source through a star coupling and branched light distributing elements branching from the entrance aperture air gap bridging optics to direct the light from each output aperture of fiber bundles to the photodetector.

20 Claims, 9 Drawing Sheets



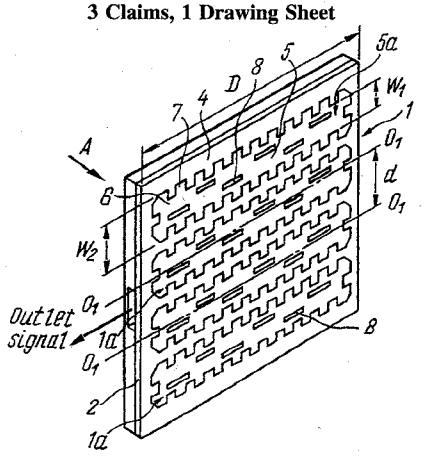
5,426,441 June 20, 1995

Planar Slot Antenna Grid

Inventors: Alexandr P. Kapitsyn, Vladimir S. Baev, and Alexandr I. Khudysh.
Assignee: Aktsionernoe Obschestvo Otkrytogo Tipa Zavod "Krasnoe Znamy."
Filed: Mar. 25, 1991.

***Abstract*—A planar slot antenna grid contains a number of waveguide-slot radiators having wide reverse side and wide outer side faces in which there are obtained, respectively, exciting slots of coupling and radiating slots. The faces lie correspondingly in two parallel planes, and a waveguide-feeder network is formed by waveguide distributors of power and feeding waveguides. Channels of the waveguides communicate with the exciting slots of coupling. The waveguide-slot radiators represent strip-line waveguides including a common dielectric substrate. The reverse side of the substrate is covered by a metallized coating serving as a common wide reverse side face of the waveguide-slot radiators. Each wide outer side face of the radiators represents a stripline made of alternating narrow and wide segments formed on the outer side face of the dielectric substrate.**

3 Claims, 1 Drawing Sheet



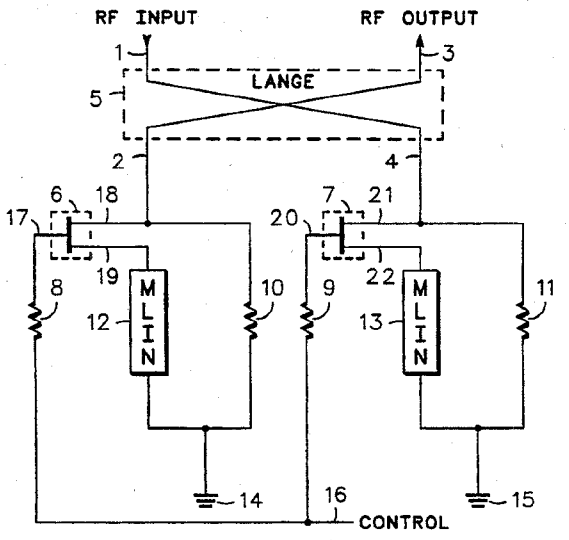
5,428,320 June 27, 1995

Biphase Modulator and Method Without Matching Elements

Inventors: Craig E. Lindberg and Michael Dydyk.
Assignee: Motorola, Inc.
Filed: Aug. 29, 1994.

***Abstract*—A biphase modulator without matching elements includes a Lange coupler (5) including first, second, third, and fourth ports (1, 2, 3, 4), where the first port (1) receives a RF input signal. FET's (6, 7) each have a source, gate, and drain (19, 17, 18, and 22, 20, 21). The drain (18) of the first FET (6) is coupled to the second port (2), the source (19) of the first FET (6) and the second FET (7) are coupled to electrical ground, and the drain (21) of the second FET (7) is coupled to the fourth port (4). The FET's, are switched at the desired modulation frequency by a control input (16) to the gates (17, 20), alternately providing a zero volt signal and a pinch-off voltage signal, which produces a biphase modulated RF input signal at the third port (3) of the Lang coupler (5).**

18 Claims, 2 Drawing Sheets



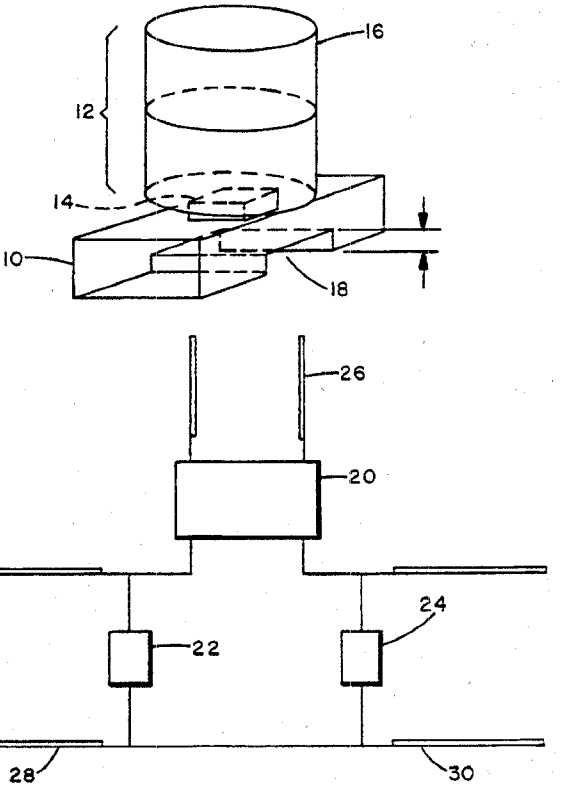
5,428,322 June 27, 1995

Microwave Waveguide Multiplexer

Inventors: Louis W. Hendrick, Krishnan Raghaven, and Craig N. Schwartz.
Assignee: Hughes Aircraft Company.
Filed: Feb. 22, 1994.

***Abstract*—A right-angle waveguide junction for a microwave multiplexer is provided including a step in one of the waveguides for improved electrical response. A rectangular waveguide manifold (10) is coupled to a filter (12) which includes a coupling iris (14) and a circular cavity resonator (16). The circular cavity resonator is a circular waveguide with two ends closed by a metal wall. The structure of the waveguide multiplexer includes a step change (18) in the rectangular waveguide (10) height, which controls the electrical response properties of the junction.**

4 Claims, 3 Drawing Sheets



5,428,364 June 27, 1995

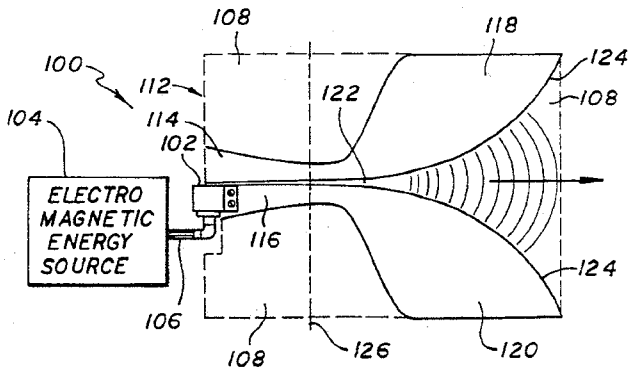
Wideband Dipole Radiating Element with a Slot Line Feed Having a Klopfenstein Impedance Taper

Inventors: Jar J. Lee and Stan W. Livingston.
Assignee: Hughes Aircraft Company.
Filed: May 20, 1993.

***Abstract*—A wideband radiating element including an input mechanism for receiving electromagnetic energy from a source and a balanced feeding mechanism extending from the input mechanism for transmitting the electromagnetic energy and for providing impedance matching over a range of frequencies. Finally, a dipole mechanism extending from the balanced**

feeding mechanism is provided for radiating the electromagnetic energy where the dipole mechanism has a shape to provide wide bandwidth impedance matching. In a preferred embodiment, an input mounting block is connected to the two opposing sides of a planar dielectric substrate. A balanced narrow conductor slot line extends from the input mounting block on both sides of the dielectric substrate to transmit the electromagnetic energy and to provide impedance matching over a frequency range of (0.5–18) GHz. The narrow conductor slot line is tapered to match the radiation resistance of a dipole element utilized to radiate the electromagnetic energy. The dipole element extends from the balanced narrow conductor slot line on both sides of the dielectric substrate with each wing having a expanded width for accommodating surface current of various distributions over the frequency range. The dipole element also includes an inner taper for radiating energy over the frequency range with the position of the dipole element relative to a ground plane being optimized to minimize radiation reflection.

4 Claims, 5 Drawing Sheets



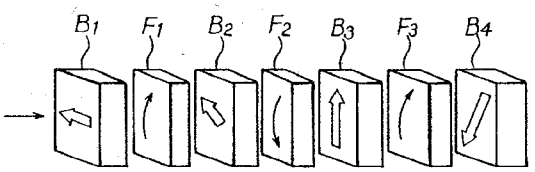
5,428,477 June 27, 1995

Optical Isolator Operating Independent of Polarization of an Incident Beam

Inventor: Kenichi Siroki.
Assignee: Tokin Corporation.
Filed: Nov. 19, 1993.

Abstract—A polarization-independent optical isolator comprises three Faraday rotators and four birefringent elements. An optical arrangement of these elements is determined on the basis of the appropriate values derived from the analysis for polarization-independency. A transmission loss characteristic, which is most important in practical use of the optical isolator, is maintained at an excellent level even in presence of variation in temperature and wavelength and in the presence of fluctuation in working precision. Deterioration of various isolator properties can be avoided.

2 Claims, 12 Drawings Sheets



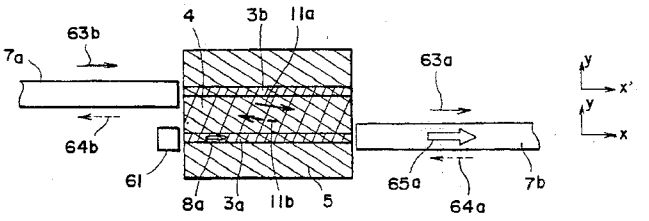
5,428,695 June 27, 1995

Optical Nonreciprocal Circuit of Waveguide Type

Inventor: Yoshinori Ohta.
Assignee: NEC Corporation.
Filed: Aug. 9, 1994.

Abstract—An optical nonreciprocal circuit is constituted by a channel waveguide, a planar waveguide, and a diffraction lattice or grating. The channel waveguide is disposed in a planar substrate that is transmissive to optical waves. The planar waveguide is disposed on only one side of the substrate plane divided by the channel waveguide in the substrate plane and having an equivalent refractive index lower than that in the channel waveguide. The diffraction grating provides a spatial periodic change of the refractive index to a guided optical wave of the channel waveguide. The periodicity of the lattice direction, that is, the direction of the wavenumber vector, is neither parallel nor perpendicular to the optical transmission direction of the channel waveguide but is given a finite angle. The optical nonreciprocal circuit can be realized by using only an ordinary dielectric material with the circuit being highly productive and low priced and having high performance.

8 Claims, 7 Drawing Sheets



5,426,400 June 20, 1995

Broadband Coplanar Waveguide to Slotline Transition Having a Slot Cavity

Inventors: Thinh Q. Ho and Stephen M. Hart.
Assignee: The United States of America as represented by the Secretary of the Navy.
Filed: June 17, 1993.

Abstract—A broadband coplanar waveguide to slotline transition for transferring radio frequency energy having a wavelength, λ, comprises: 1) a dielectric substrate having a first planar surface; an electrically conductive layer formed on the first planar surface; 2) a coplanar waveguide including: a) a center conductor defined by a section of the electrically conductive layer bordered by first and second parallel channels formed in the electrically conductive layer so as to expose the dielectric substrate; b) a first ground plane defined by a section of the electrically conductive layer bordering the first channel; and c) a second ground plane defined by a section of the electrically conductive layer bordering the second channel; 3) a slot cavity formed in the electrically conductive layer so as to expose an area of the dielectric substrate, the slot cavity coextensive with the first channel and having a periphery such that the length of a line segment intersecting two points of the periphery and a centroid of the area is approximately $\lambda/4$; and 4) a slotline defined by a third channel formed in the electrically conductive layer that is coextensive with the second channel.

21 Claims, 5 Drawing Sheets