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.

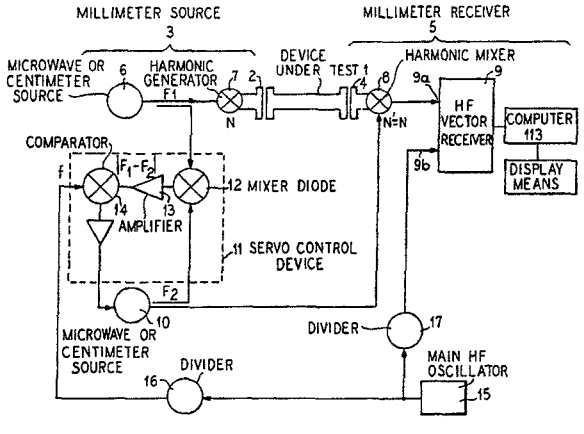
5,119,035 June 2, 1992

Millimeter and/or Submillimeter Network Vector Analyzer

Inventors: Philippe Goy and Michel Gross.
Assignee: AB Millimetre.
Filed: Sept. 28, 1990.

Abstract—A millimeter and/or submillimeter network vector analyzer comprises a millimeter source and a millimeter heterodyne receiver, and the network to be analyzed is placed between the source and the receiver. The millimeter source comprises a first microwave source feeding a millimeter harmonic generator. The millimeter heterodyne receiver comprises a millimeter harmonic mixer which is fed by a second microwave source which serves as a local oscillator for it, an HF (high frequency) vector receiver and a device for displaying the characteristics of the analyzed network. The analyzer includes a device for servocontrolling the frequency of emission of the second microwave source by the frequency of the first microwave source (or conversely), and a main HF (high frequency) oscillator activating this servocontrol device. The main oscillator is also directly used as a phase reference for the HF (high frequency) vector receiver. Both the millimeter harmonic generator fed by the first microwave source and the millimeter harmonic mixer of the millimeter heterodyne receiver operate at the same harmonic order. The analyzer makes possible vector measurements in all millimeter and submillimeter bands up to the terahertz frequency range without corresponding directional couplers or microwave frequency synthesizer.

18 Claims, 4 Drawing Sheets



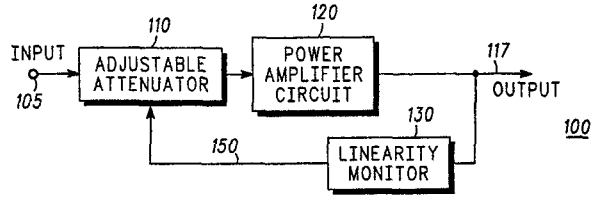
5,119,040 June 2, 1992

Method and Apparatus for Optimizing the Performance of a Power Amplifier Circuit

Inventors: James F. Long and Mark G. Obermann.
Assignee: Motorola, Inc.
Filed: Jan. 4, 1991.

Abstract—The present invention discloses a method and apparatus for optimizing the performance of a power amplifier circuit. In accordance therewith, one of the intermodulation products generated during a power amplifier's operation is selected. This selection is based upon the intermodulation product's amplitude. Next, the intermodulation product's amplitude is compared to a predetermined threshold. Based upon this comparison, various power amplifier circuit operating parameters are altered in order to improve the circuit's intermodulation performance or to maximize its operating capacity.

20 Claims, 2 Drawing Sheets



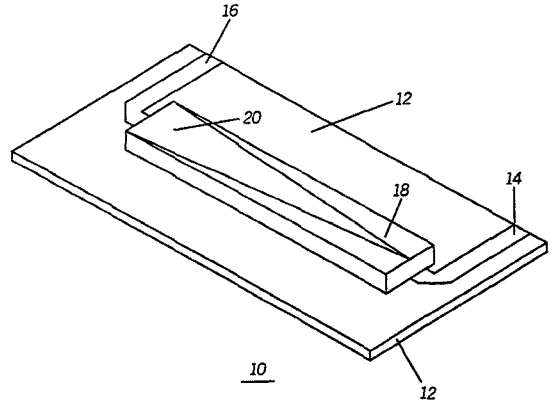
5,119,048 June 2, 1992

Pseudo Tapered Lines Using Modified Ground Planes

Inventor: Randall L. Grunwell.
Filed: Nov. 5, 1990.

Abstract—A network (10) for matching impedance from a first transmission line (14) to a second transmission line (16) includes a dielectric material (12, 20), a conductor (24, 26, 28), and metalization (18, 30) located on at least some portions of at least one outer surface of the dielectric material. The area covered by the metalization gradually diminishes from the first transmission line to the second transmission line. The conductor provides an electrical connection between the first transmission line and the second transmission line. The conductor provides an electrical connection between the first transmission line and the second transmission line, and is located at least partially within the dielectric material.

6 Claims, 1 Drawing Sheet



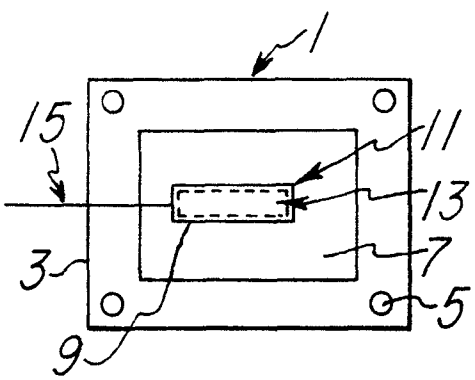
5,119,052 June 2, 1992

GaAs Monolithic Waveguide Switch

Inventors: Larry C. Witkowski, Hua Q. Tserng, Robert C. Vogas, Charles M. Rhoads, and Oren B. Kesler.
Assignee: Texas Instruments Incorporated.
Filed: Oct. 23, 1990.

Abstract—A GaAs monolithic waveguide switch and system for low power consumption and high frequency switching wherein a single GaAs chip is flip-chip mounted onto a waveguide slot and inserted between interconnecting waveguides to provide single pole single throw switching. The GaAs chip includes an array of MESFET's along with connecting electrodes configured to provide low loss in the biased state and high loss in the unbiased state. The use of a single GaAs monolithic chip provides improved RF performance and manufacturability over discrete devices and provides lower power consumption as compared with silicon PIN diode waveguide switches.

12 Claims, 1 Drawing Sheet



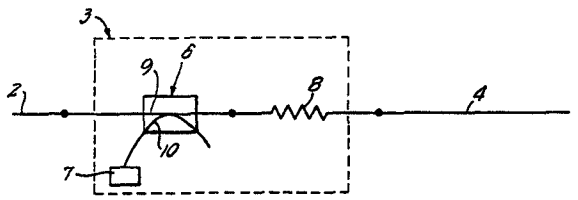
5,119,229 June 2, 1992

Amplifer for Optical Fiber Telecommunication Lines and Optical Fiber Telecommunication Lines Incorporating Said Amplifier

Inventors: Giorgio Grasso, Aldo Righetti, and Flavio Fontana.
Assignee: Societa Cavi Pirelli S.p.A.
Filed: Oct. 22, 1990.

Abstract—An optical amplifier (3) in accordance with the invention consists of the assembly of a length of active-core optical fiber (8), single-mode to both pumping and signal optical radiations, and a dichroic coupler (6) which includes two optical fiber lengths (9, 10), both single mode to pumping and signal optical radiations, coupled to each other over one portion (11) by fusion of the respective claddings and substantial setting in common of the respective cores in the fused portion (11).

12 Claims, 1 Drawing Sheet



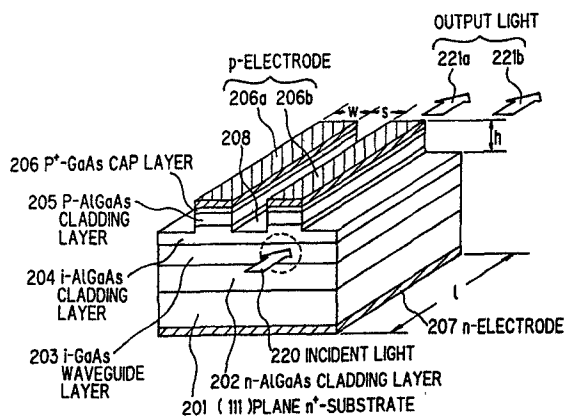
5,119,449 June 2, 1992

Optical Directional Coupler Switch

Inventors: Keiro Komatsu, Kunio Tada, Hiroyasu Noguchi, and Akira Suzuki.
Assignee: NEC Corporation.
Filed: Feb. 28, 1990.

Abstract—An optical directional coupler switch is fabricated from a semiconductor substrate having a (111) plane. Thus, refractive indexes are changed for TE and TM modes by electrooptic effect, although the change amount is different between TE and TM modes. Therefore, a switching operation is realized for an incident light having any polarization. A device length L is preferably set to meet an equation of "$L_{TE} \leqq L \leqq L_{TM}$" ($L_{TE}$ and L_{TM} are coupling lengths for TE and TM modes) to decrease a cross-talk, even if the coupling lengths are different between TE and TM modes, considering that the difference is small.

3 Claims, 5 Drawing Sheets



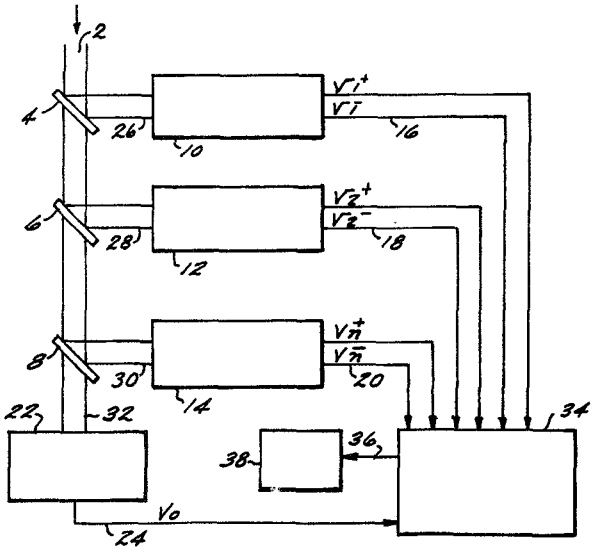
5,120,128 June 9, 1992

Apparatus for Sensing Wavefront Aberration

Inventors: Bobby L. Ulich and Anthony D. Gleckler.
Assignee: Kaman Aerospace Corporation.
Filed: Jan. 14, 1991.

Abstract—A wavefront aberration sensor includes a beam splitter, one or more aberration sensor modules and a photodetector for sensing total light power. The aberration sensor modules each provide two voltage outputs from a pair of photodetectors. Differences in the voltage pairs are normalized by the total light power to represent signed aberration amplitudes of phase aberrations present in an input optical beam. The aberration amplitudes may be combined in a digital computer to provide a reconstructed wavefront.

14 Claims, 4 Drawing Sheets



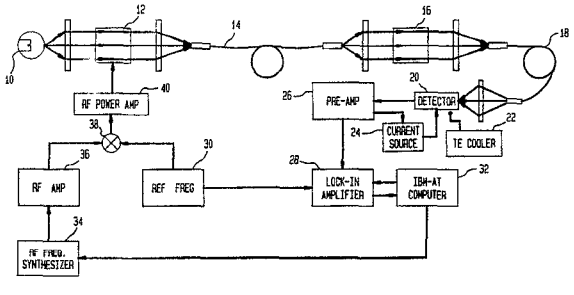
5,120,961 June 9, 1992

High Sensitivity Acoustooptic Tunable Filter Spectrometer

Inventors: Kenneth H. Levin and Frank Y. Li.
Assignee: Infrared Fiber Systems, Inc.
Filed: Mar. 16, 1990.

Abstract—An acoustooptical filter (AOTF) is used in a spectrometer for analysis of samples. The spectrometer provides continuous wave RF excitation through the crystal, and the spectrometer provides control and modulation for said RF source. The signal-to-noise ratio is improved by use of a lock-in amplifier which demodulates the modulation frequency. Fiber optics are used to connect the crystal to the source, and the source to the detection system. A digital lock-in amplifier is designed which increases the efficiency, accuracy, sensitivity and decreases the cost of conventional analog lock-in amplifier.

23 Claims, 5 Drawing Sheets



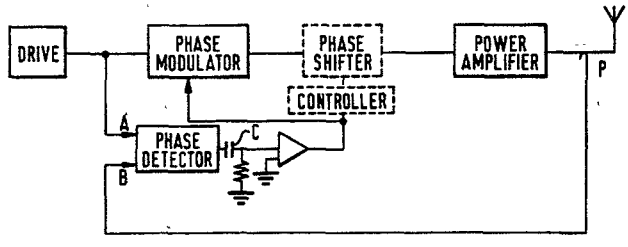
5,121,077 June 9, 1992

Circuit for Reducing Distortion Produced by an RF Power Amplifier

Inventor: Melvyn McGann.
Assignee: The Marconi Company Limited.
Filed: Jan. 30, 1991.

Abstract—A high frequency SSB radio transmitter has an envelope amplitude modulator for varying the envelope of an RF signal source based on an error signal from envelope detectors detecting the envelope of the input and output waveform. It also has a first phase modulator in a main feedback loop for varying the phase of the input waveform based on differences detected in a phase detector between the instantaneous phase of the input and output RF signal. To overcome the problem of spurious outputs from the phase detector resulting from the cross-over points of the SSB waveform when there are carrier breaks and other problems, a subsidiary, phase lock loop feeds a signal derived from the error signal to a second phase modulator to tend to hold the inputs to the phase detector in such a phase relationship that the output is zero. To cope with large phase shift errors between the input waveform and the output which result when the power amplifier changes frequency or temperature variations e.g., at the antenna, a broadband phase shifting network is brought into operation when a dual voltage comparator senses that the signal fed to the second modulator passes a value corresponding to its extremes of adjustment.

16 Claims, 3 Drawing Sheets



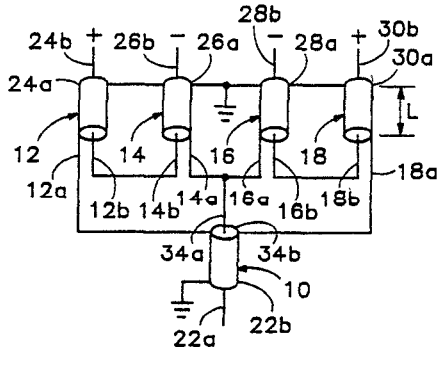
5,121,090 June 9, 1992

Balun Providing Dual Balanced Outputs

Inventors: Valdis E. Garuts and Clifford H. Moulton.
Assignee: Tektronic, Inc.
Filed: Apr. 9, 1990.

Abstract—A dual output balun distributes substantially all of the available power in a single ended input signal applied thereto (less small parasitic losses) equally to two or more pairs of push-pull output terminals (or vice versa).

6 Claims, 4 Drawing Sheets



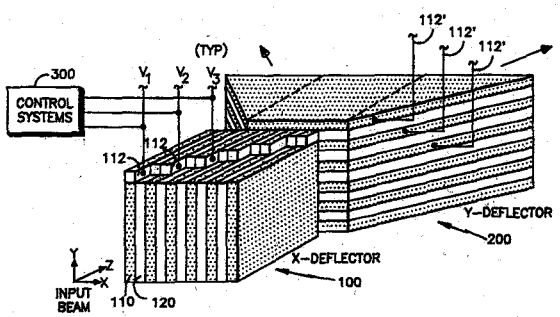
5,122,894 June 16, 1992

Electrooptic Beam Deflection

Inventor: Daniel H. Grantham.
Assignee: United Technologies Corporation.
Filed: Nov. 3, 1989.

Abstract—An optical deflection device for manipulating optical beams employs a set of layers having the configuration NUPUN . . . , where the N and P symbols refer to N-type and P-type dopants and the U symbol refers to an electrooptically active optical guide layer having an index of refraction sufficiently higher than that of the N- and P- layers that light is guided within it and a free electron concentration low enough that the guide layers are depleted, so that light is guided within the layers with low loss, while the N- and P-layers have an appropriate bias applied to establish a differential phase shift between layers to deflect emitted radiation along a desired angle.

8 Claims, 3 Drawing Sheets



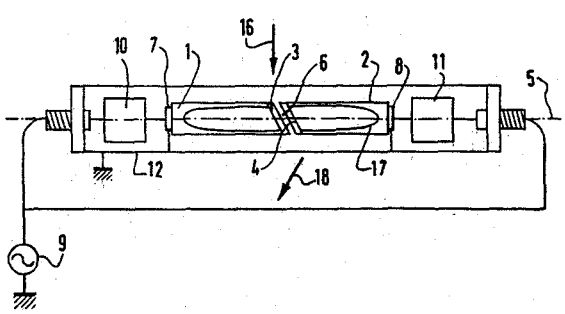
5,122,898 June 16, 1992

Acoustooptical Deflector

Inventor: Jean-Pierre C. Picault.
Assignee: A.A.SA France.
Filed: May 7, 1991.

Abstract—An acoustooptical deflector disclosed, comprising, two crystals and two piezoelectric transducers associated respectively with the crystals and controlled by a variable frequency RF signal for generating, in the crystals, ultrasonic waves of the same frequency. The crystals are aligned along an acoustic axis for receiving in the aggregate a single incident light beam and generating a single diffracted beam and being spaced apart from each other by a gap creating an acoustic discontinuity without deforming the light beam.

4 Claims, 1 Drawing Sheet



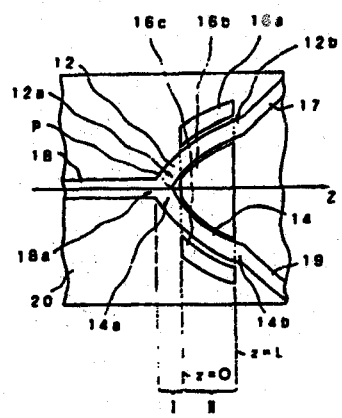
5,123,069 June 16, 1992

Waveguide-Type Optical Switch

Inventors: Hideaki Okayama, Issei Asabayashi, and Toshimasa Ishida.
Assignee: OKI Electric Industry Co., Ltd.
Filed: July 3, 1991.

Abstract—Waveguide-type optical switch comprising a substrate, branched first and second waveguide routes provided thereon, and an electrode(s) provided on the substrate for controlling the propagation-constant difference or refractive index difference between the first and second waveguide routes. The interval between the first and second waveguide routes is extended towards the terminal end sides from the branch point side of the waveguide routes. The first and second waveguide routes are provided with a branched part. The first and second waveguide routes are provided with at least one part of the bending portion (II) connected to the branch part, respectively. The local branch angle between the first and second waveguide routes on the side of starting ends of the bending portions (II) is enlarged while the local branch angle between the first and second waveguide routes on the side of terminal ends at the bending portions (II) is reduced.

42 Claims, 22 Drawing Sheets



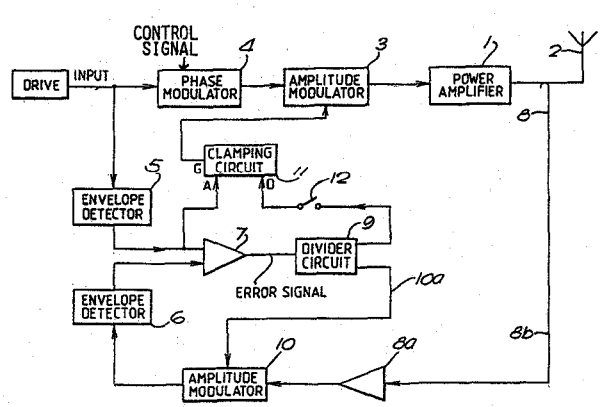
5,124,665 June 23, 1992

Circuit for Reducing Distortion Produced by an RF Power Amplifier

Inventor: Melvyn McGann.
Assignee: The Marconi Company Limited.
Filed: Jan. 18, 1991.

Abstract—A high-frequency SSB radio transmitter has an envelope amplitude modulator for varying the envelope of an RF signal source based on an error signal from envelope detectors detecting the envelope of the input and output waveform. It also has a phase modulator for varying the phase of the input waveform based on differences detected in a second amplitude modulator between the instantaneous phase of the input and output RF signal. A signal derived from the error signal controls the second amplitude modulator in a subsidiary feedback loop to maintain the size of the envelopes detected by the detectors the same, in order that a difference amplifier may operate effectively. Rapid discrepancies between the detected envelopes occurring within an envelope can then be corrected by the envelope amplitude modulator.

13 Claims, 3 Drawing Sheets



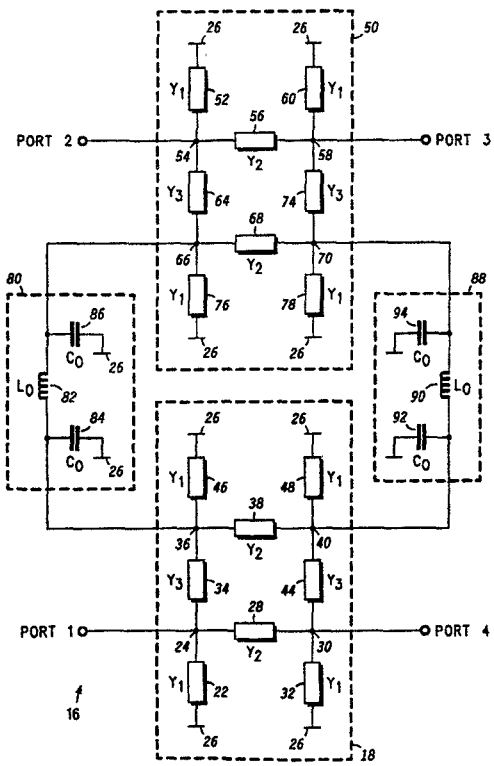
5,124,674 June 23, 1992

Lumped Element Directional Filter

Inventors: Michael Dydyk and Vijay Nair.
Assignee: Motorola, Inc.
Filed: Mar. 4, 1991.

Abstract—A directional filter is provided implemented with passive lumped elements in several embodiments for a general 18–element network, to an intermediate ten-element embodiment and a simple two-element filter each with features and advantages depending on the application. In general, a directional filter with lumped elements requires less physical area with similar performance characteristics as conventional transmission lines which is desirable in technologies such as MMIC.

8 Claims, 6 Drawing Sheets



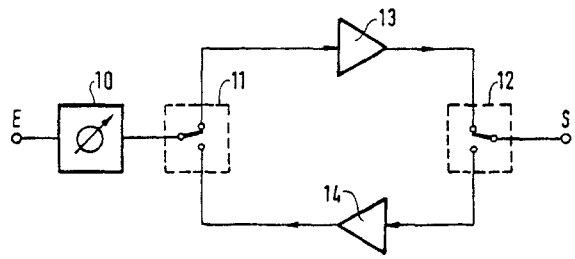
5,124,712 June 23, 1992

Method of Forming the Radiation Pattern of a High-Efficiency Active Antenna for an Electonically-Scanned Radar, and an Antenna Implementing the Method

Inventors: Gérard Caille and Cyril Mangenot.
Assignee: Alcatel Espace.
Filed: Mar. 6, 1991.

Abstract—A method of forming the radiation pattern of a high efficiency active antenna for electronically-scanned radar, wherein its illumination laws, and thus its radiation patterns are dissociated in transmission and in reception; and equal amplitude illumination is provided in transmission in order to maximize the efficiency of the transmit amplifiers which are all identical, thereby minimizing their dc energy consumption and their dissipation. The invention is particularly suitable for use in space radars.

9 Claims, 25 Drawing Sheets



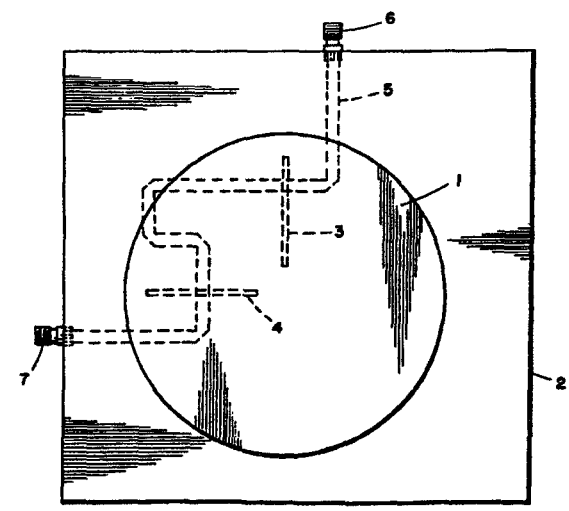
5,124,713 June 23, 1992

Planar Microwave Antenna for Producing Circular Polarization from a Patch Radiator

Inventors: Paul E. Mayes, Hugh K. Smith, and James R. Gentle.
Filed: Sept. 18, 1990.

Abstract—A planar antenna is described which employs a thin patch of conductive material supported above and substantially parallel to a closely spaced thin conductive ground surface. Two or more narrow slots are positioned in the ground surface beneath the conductive patch. A microstrip transmission line, placed below the ground surface, excites the slots in series. The length of the microstrip line between the slots, the position of the microstrip line across the slots, and the dimensions of the slots are chosen to excite two orthogonal modes in the conductive patch in phase quadrature. This excitation results in a planar antenna which receives and transmits electromagnetic waves of circular polarization. The antenna may also employ a coplanar waveguide transmission line instead of the aforementioned microstrip transmission line. The coupling apertures then form slot discontinuities in series with the coplanar transmission line, which are positioned under the conductive patch. The antenna may also employ several conductive patches stacked over each other in a parallel fashion to enhance antenna performance.

18 Claims, 3 Drawing Sheets



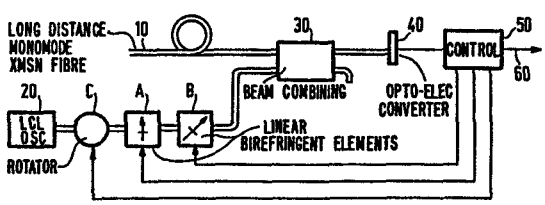
5,124,828 June 23, 1992

Device for Heterodyne Detection of an Optical Signal and for Reducing Noise in the Signal Using Polarization Control Elements

Inventor: Cathal J. Mahon.
Assignee: U.S. Philips Corporation.
Filed: Aug. 6, 1991.

Abstract—Device for optical heterodyne detection of an optical signal beam and an optical transmission system provided with such a device. An optical heterodyne detection device is described in which with the aid of three controllable elements (A, B, and C), to influence the state of polarization and having a limited control range, such as Faraday rotators or birefringent electro-optical crystals, the state of polarization of radiation originating from a local oscillator (30) is made to correspond to the signal beam transmitted through a long-distance transmission fiber (10).

16 Claims, 10 Drawing Sheets



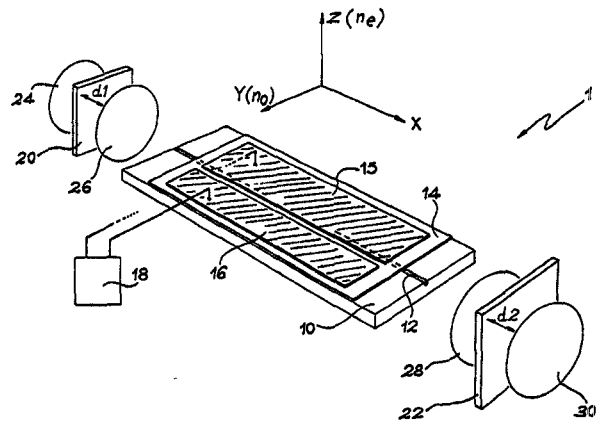
5,125,049 June 23, 1992

Multipurpose Component with Integrated Optics and Distribution Network with Optical Amplification

Inventors: André Hamel, Jean-Claude Simon, Jean-Pierre Goedgebuer, and Henri Porte.
Assignee: French State represented by the Minister of Post, Telecommunications and Space.
Filed: Oct. 5, 1990.

Abstract—A multipurpose component with integrated optics includes an optical light guide (12) formed on one face of a substrate (10) made of a double refracting material having neutral axes orientated so that one electromagnetic wave extending into the guide (12) is split up into two waves having polarizations perpendicular to each other and along the neutral axes. A power source (18) applies an electric filed perpendicular to the optical light guide (12) and uniformly along the guide (12). Two rectilinear polarizers (20, 22) with polarization directions (d1, d2) parallel to each other are each disposed at one extremity of the guide (12). The component also includes focussing means (24, 26, 28, 30). The component has particular utility for tunable optical filtering and optical telecommunications.

7 Claims, 4 Drawing Sheets



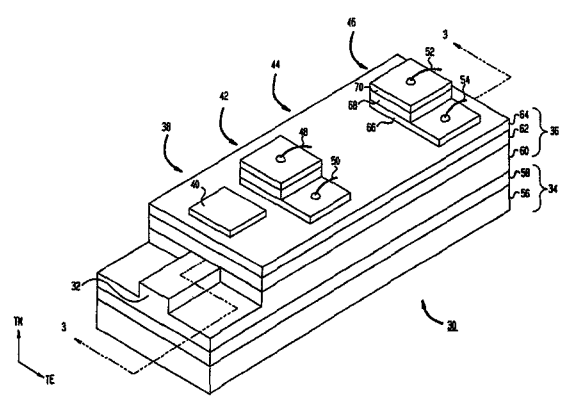
5,125,050 June 23, 1992

Vertical Metallically Loaded Polarization Splitter and Polarization-Diversified Optical Receiver

Inventor: Robert J. Deri
Assignee: Bell Communications Research, Inc.
Filed: May 3, 1991

Abstract—A polarization diversity receiver comprising a lower optical waveguide and an upper waveguide formed thereover in the area of the receiver. A rib formed in the lower waveguide away from the receiver directs light along an optical axis in the receiver. A metal layer deposited over the upper waveguide preferentially couples light of the TE-mode from the lower to the upper waveguide, where it is detected by a p-i-n photo-diode. A second p-i-n photo-diode is formed on the optical axis a distance away from the first photo-diode. The intervening region acts as a coupling region to couple the remaining TM-mode radiation from the lower to the upper waveguide, where it is detected by the second photo-diode.

10 Claims, 3 Drawing Sheets



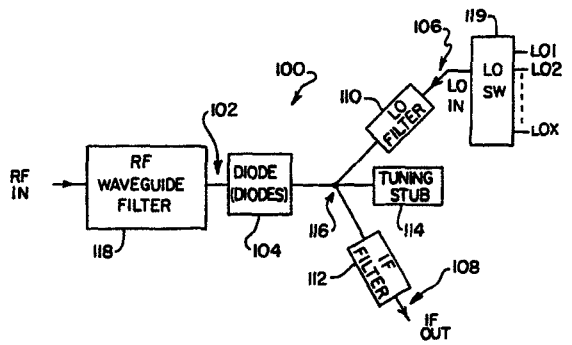
5,125,110 June 23, 1992

Microstripline Microwave Mixer Using Waveguide Filter

Inventor: Marwan E. Nusair.
Assignee: Valentine Research, Inc.
Filed: Oct. 17, 1990.

Abstract—A microstripline microwave mixer circuit includes a waveguide microstrip filter formed by coupling a section of ridged waveguide to a microstripline circuit. The ridged waveguide based microstrip filter both serves as a high-pass filter for RF input signals and also provides a suitable termination for the RF input side of the mixer circuit resulting in a compact multifrequency mixer circuit with good performance. The section of ridged waveguide is coupled to the microstripline circuit such that the dielectric substrate of the microstripline circuit is within the waveguide section thereby increasing the effective dielectric constant of the waveguide interior and decreasing the dimensions of the waveguide. This configuration of the high-pass filter presents a smaller component than would be present in air-filled waveguide mixer circuits.

7 Claims, 1 Drawing Sheet



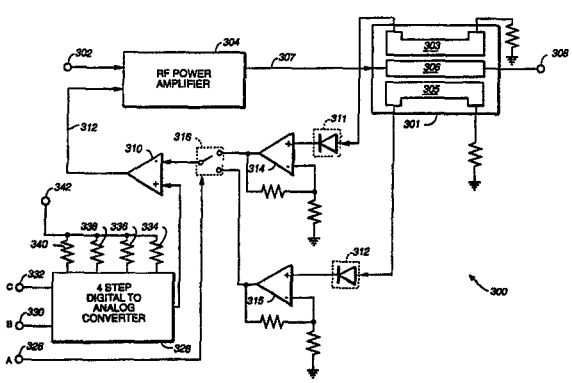
5,126,686 June 30, 1992

RF Amplifier System Having Multiple Selectable Power Output Levels

Inventor: Ambrose W. C. Tam.
Assignee: Astec International, Ltd.
Filed: Aug. 15, 1989.

Abstract—A control circuit for a radio frequency (RF) amplifier having multiple selectable power output levels in response to a plurality of input control signals is presented. The RF amplifier includes a variable gain input which is responsive to the control circuit. The control circuit includes an attenuator coupled to the output of the RF amplifier for providing an attenuated rf signal and a detector coupled to the output of the attenuator for generating a dc output signal which is substantially linearly related to the magnitude of the RF signal output by the RF amplifier. The control circuit also includes a means coupled to the input control signals for selecting one of a plurality of amplification factors. An amplifier is used to amplify the dc output signal generated by the detector using the selected amplification factors. The amplified output is coupled to the variable gain input of the RF amplifier.

14 Claims, 7 Drawing Sheets



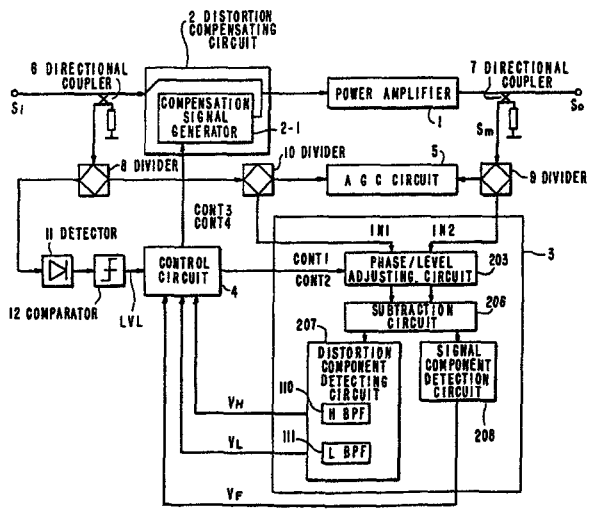
5,126,687 June 30, 1992

Amplifier System for Automatically Minimizing Distortion

Inventors: Masahiro Onoda and Yoshifumi Toda.
Assignee: Fujitsu Limited.
Filed: May 31, 1991.

Abstract—An amplifier system includes a power amplifier which generates undesired distortion in its main output signal, and a distortion detecting circuit for detecting distortion spectrums included in the main output signal so as to output a distortion level indicating signal by attaining a difference of a main input signal having no distortion and a monitor signal representing the main output signal while the main input signal and the monitor signal are kept in phase and equal in level. The amplifier system also includes compensation circuit, provided at the input of the amplifier, for adding a compensation signal, to the main input signal which is to be equivalent generated equivalently to the distortion in the main output signal. The amplifier system further includes and a control circuit for precisely adjusting phase and level of the compensation signal so as to keep the distortion level indicating signals minimum. Phase/level adjustment in the distortion detecting circuit by minimizing the signal component remaining in the difference signal allows for better detection of the distortion component. Thus, less expensive filters can by employed in the distortion detecting circuit. The above-described automatic distortion compensation may be disabled when the main input signal is lower than a threshold level, where the automatic compensation operation becomes unnecessary and unstable.

15 Claims, 8 Drawing Sheets



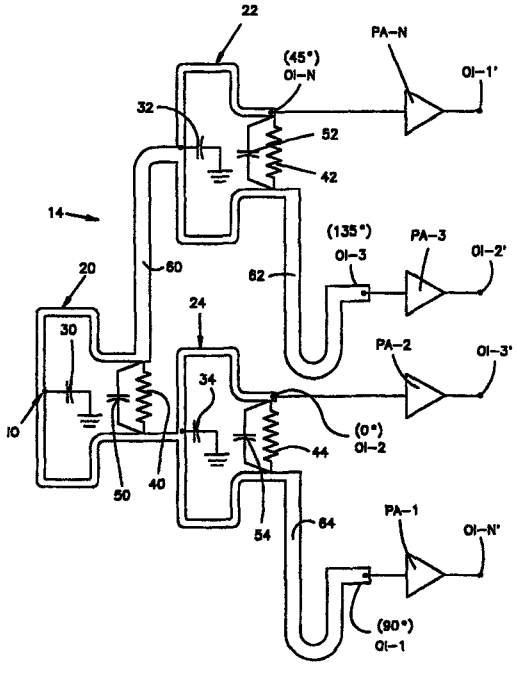
5,126,704 June 30, 1992

Polyphase Divider/Combiner

Inventors: Timothy W. Dittmer and Ralph L. Mortimore.
Assignee: Harris Corporation.
Filed: Apr. 11, 1991.

Abstract—A polyphase divider/combiner is provided and which includes a common input/output port and a plurality of N output/input ports, wherein N is an even integer greater than two. N electrical signal transmission paths are provided with each extending from the common input/output port to a respective one of the N output/input ports. The N electrical signal transmission paths are of N different electrical lengths such that the output/input ports are out of phase relative to each other by $180/N$ degrees.

8 Claims, 2 Drawing Sheets



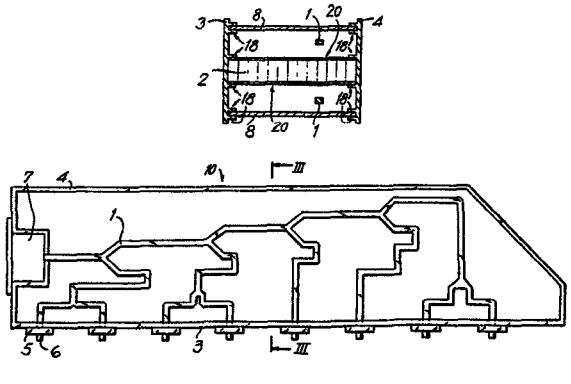
5,126,705 June 30, 1992

RF Partitioning Network for Array Antennae

Inventors: Nello Carnevali, Maurizio Cicolani, and Antonio D. Novellino.
Assignee: Selenia Industrie Elettroniche Associate S.p.A.
Filed: July 23, 1990.

***Abstract*—A lightweight mechanical structure is provided for supporting an RF partitioning network for a large dimension array antenna. The network consists of two horizontally disposed stripline RF dividing circuits positioned in two enclosed portions of the network. The network is formed within an enclosure which is made up of rigid side frames and electrically conductive ground planes between which the microwave stripline dividing circuit is formed. The ground plates of the stripline circuit are bonded to rigid honeycomb materials so as to provide structural support. The network is assembled by means of suitable structural adhesives. The structure of the partitioning network of the present invention provides for the RF feeding and mechanical support of large dimension array antennas in one assembly. The network requires a reduced number of tooling and finishing steps so as to achieve a low manufacturing cost while still providing good planarity and rigidity properties and reduced weight in a structure having large overall dimensions.**

7 Claims, 2 Drawing Sheets



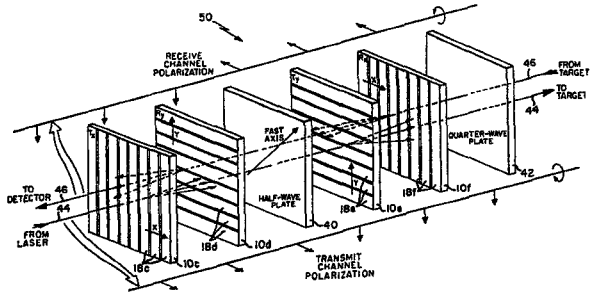
5,126,869 June 30, 1992

Two-Dimensional, Phased-Array Optical Beam Steerer

Inventors: W. Michael Lipchak and Terry A. Dorschner.
Assignee: Raytheon Company.
Filed: Dec. 3, 1990.

***Abstract*—An optical beam steering device for use in a single-aperture laser transceiver system provides deflection of the transmitted and received beam in two planes, while maintaining the distinctive identities, of each channel respective to their polarizations. The invention utilizes four single-dimensional beam deflecting devices, two for each orthogonal linear polarization of the two transceiver channels, one of these for each steering axis. In addition, a 90° polarization rotator and a quarter-wave plate are included in the arrangement of beam deflecting devices to satisfy the polarization requirements of these devices and of the transceiver channels. In a preferred embodiment, the beam deflecting devices comprise liquid crystal cells functioning as variable phase retarders, each of the cells comprising a first window having a common electrode, a second window having a multiplicity of electrodes in the form of electrically isolated, parallel stripes, and a layer of liquid crystal molecules intermediate the first and second windows. Means are provided for coupling a multiplicity of control signals individually between the multiplicity of stripe electrodes and the common electrode, thereby creating selectable local variations of refractive index in the liquid crystal layer.**

19 Claims, 4 Drawing Sheets



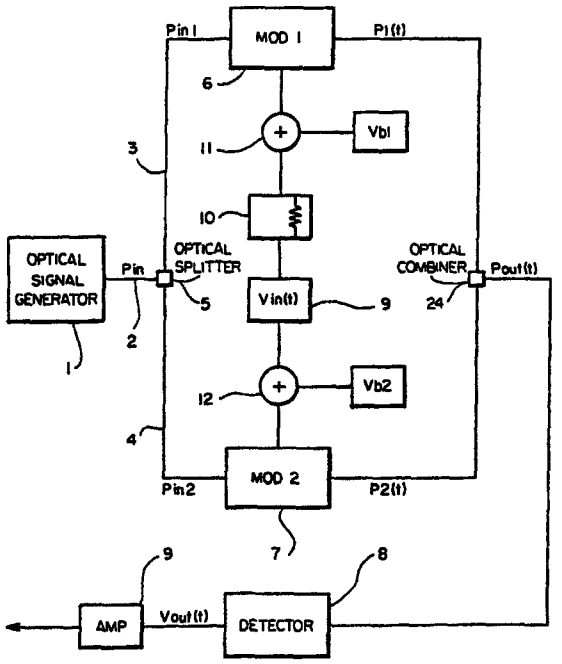
5,126,870 June 30, 1992

Linear Broad-Band Signal Generator Using Primary and Secondary Optical Modulators

Inventors: Richard M. Murphy, Peter W. Cornish, and Gregory S. Maurer.
Assignee: Raynet Corporation.
Filed: Dec. 22, 1989.

***Abstract*—A linear optical broad-band signal generator includes primary and secondary optical modulators whose outputs are combined so as to minimize intermodulation distortion of a modulated optical signal. A constant amplitude optical signal is split differentially so as to create primary and secondary power levels, the primary and secondary power levels being inputted into the primary and secondary modulators. An electrical input to one of the modulators is differentially attenuated so as to reduce third-order modulation products when modulated outputs of the modulators are combined. In addition, the total modulated optical output power is maximized by adjustment to one of the outputs of one of the modulators so that its phase is more in line with a phase of the output of the other modulator so as to maximize first-order products of the combined output.**

20 Claims, 4 Drawing Sheets


Pin1
MOD 1
P1(t)
6
3
11
Vb1
10
OPTICAL SIGNAL GENERATOR
Pin
OPTICAL SPLITTER
5
Vin(t)
9
OPTICAL COMBINER
24
Pout(t)
2
1
12
Vb2
4
Pin2
MOD 2
P2(t)
7
8
9
AMP
Vout(t)
DETECTOR