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.

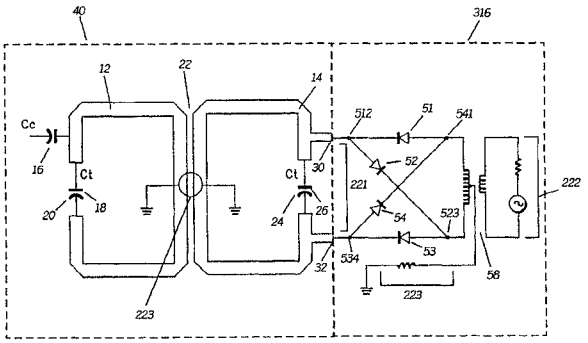
5,361,050 Nov. 1, 1994

Balanced Split Ring Resonator

Inventor: Stephen B. Einbinder.
Assignee: Motorola, Inc.
Filed: July 6, 1993.

Abstract—A bandpass filter (**40**) includes a first microstrip split-ring resonator (**12**) having at least a first edge and a second edge, the first edge having a gap (**20**), and an input. The bandpass filter (**40**) also includes a second microstrip split-ring resonator (**14**), having at least a first edge and a second edge, the first edge being coupled to the second edge of the first microstrip split-ring resonator electromagnetically (**22**) and by a central grounding aperture (**223**), and the second edge of the second microstrip split-ring resonator comprising a gap (**26**) and a balanced output (**30, 32**)

8 Claims, 3 Drawing Sheets



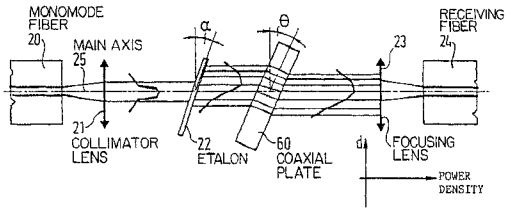
5,361,155 Nov. 1, 1994

Optical Filter Tuned by Rotation and Comprising a Fabry-Perot Interferometer

Inventors: Dominique Chiaroni and Paulette Morin.
Assignee: Alcatel Cit.
Filed: Mar. 23, 1993.

Abstract—A rotation-tuned optical filter comprises a Fabry-Perot-type interferometer disposed between an optical source and an optical receiver. The interferometer filters an input optical signal from the optical source. The input optical signal propagates substantially in a single mode The interferometer supplies a filtered optical signal to the optical receiver, which comprises a receiving surface that integrates the power density of the filtered optical signal. The filter comprises means for modifying the position of the filtered optical signal relative to the receiving surface of the optical receiver

8 Claims, 4 Drawing Sheets



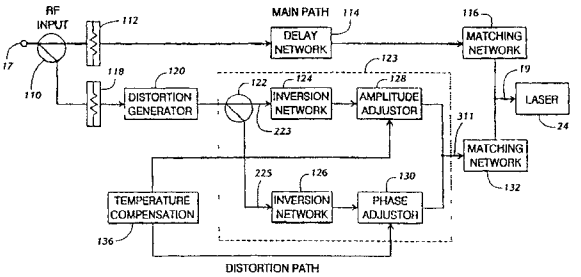
5,361,156 Nov. 1, 1994

Method and Apparatus for Predistortion

Inventor: Rezin E. Pidgeon.
Assignee: Scientific-Atlanta, Inc.
Filed: Dec. 9, 1991.

Abstract—A predistortion circuit for an optical communications system includes a main path and a predistortion path for an RF modulating signal that are independently level adjusted and impedance matched to a laser diode. The distortion path includes a distortion generator that generates a distortion signal substantially the same as the distortion generated by the modulation of the transmission system. The distortion path further includes an in-phase adjustment leg for overall amplitude adjustment and amplitude adjustment as a function of frequency and a quadrature adjustment leg for phase adjustment as a function of frequency. Temperature compensation is provided to the adjustment networks to stabilize the gain elements of each for ambient temperature changes.

44 Claims, 8 Drawing Sheets



5,361,157 Nov. 1, 1994

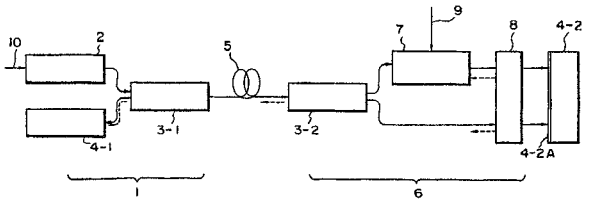
Bidirectional Light Transmission System and Optical Device Therefor

Inventors: Tadasu Ishikawa, Mikio Maeda, Kimiyuki Oyamada, Shuichi Fujisawa, Yozo Utsumi, Kuniharu Takizawa.
Assignee: Nippon Hoso Kyokai.
Filed: Aug. 25, 1992.

Abstract—A bidirectional light transmission system comprises a transmitting station having a light source for intensity-modulating a transmission signal, a first light branching portion for branching intensity-modulated light of the light source in a predetermined ratio and a first light receiving portion, and a receiving station having a second light branching portion, a light phase-modulating portion, a light reflecting portion, and a second light receiving portion The transmitting station transmits the intensity-modulated light via a

single optical fiber transmission line to the receiving station connected thereto and receives a returned signal returned from the receiving station via the single optical fiber transmission line in the first light receiving portion, and the receiving station branches the transmitted light into first branched light and second branched light in the second light branching portion, phase-modulates at least one of the first branched light and second branched light in the light phase-modulating portion, transmits part of the first branched light and second branched light to the second receiving portion via the light reflecting portion, simultaneously intensity-modulates reflected part of the first branched light and second branched light as a returned signal in the light phase-modulating portion and the second light branching portion, and returns the returned signal to the transmitting station via the single optical fiber transmission line.

18 Claims, 18 Drawing Sheets



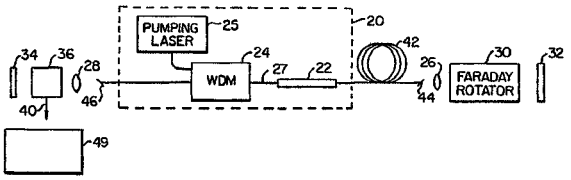
5,361,161 Nov. 1, 1994

Variable Spectral Width Optical Noise Source

Inventors: Douglas M. Baney and Wayne V. Sorin.
Assignee: Hewlett-Packard Company.
Filed: Aug. 24, 1993.

Abstract—An optical noise source. An optical amplifier produces unpolarized optical noise by spontaneous emission. The optical noise is emitted from one side of the amplifier and filtered by a bandpass filter to attenuate any noise having a wavelength outside a desired bandspread. The filtered noise is reflected back through the amplifier for one additional amplification and then emitted from the other side of the amplifier through a nonreflecting output.

9 Claims, 2 Drawing Sheets



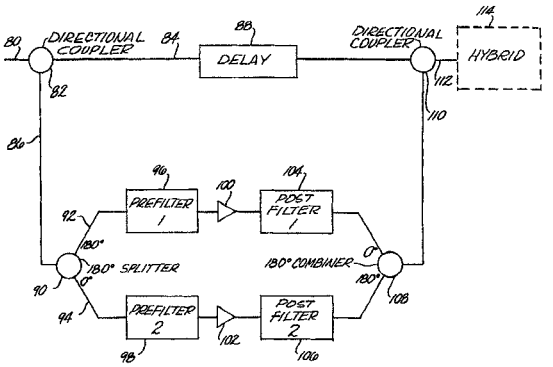
5,363,056 Nov. 8, 1994

Circuit for Linearization of Amplified Electronic Signals

Inventor: Henry A. Blauvelt.
Assignee: Ortel Corporation.
Filed: Apr. 27, 1993.

Abstract—An electronic circuit provides a linear output from an amplifying device, such as a hybrid push-pull amplifier, which has inherent distortion. In a preferred embodiment, the distortion of the hybrid amplifier is compensated by nesting a pair of hybrid push-pull amplifiers within a push-pull circuit configuration. In another embodiment, the distortion of the hybrid amplifier is compensated by providing a predistorted signal equal in magnitude, but opposite in sign, to the distortion introduced by the nonlinear device. The input signal is split into two electrical paths with the primary part of the signal applied directly to the hybrid amplifier, with a time delay to compensate for delay in the secondary path. Elements within the secondary path generate both even and odd order distortion products. These are recombined with the primary signal in proper phase and amplitude, and the resulting signal is applied to the hybrid amplifier for canceling distortion in the hybrid amplifier.

13 Claims, 2 Drawing Sheets



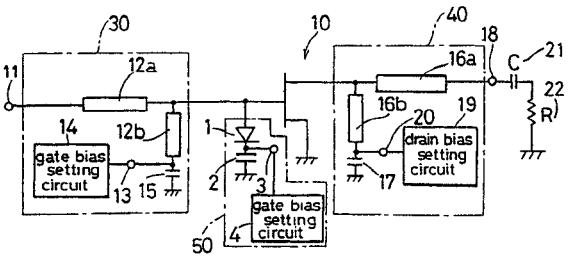
5,363,058 Nov. 8, 1994

Amplifier Having Linear Input-Output Characteristics and High Efficiency

Inventor: Yoshinobu Sasaki.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: Mar. 11, 1993.

Abstract—An amplifier for amplifying a high-frequency signal includes an input impedance matching circuit; an output impedance matching circuit; an FET having a gate and a drain connected to the input impedance matching circuit and the output impedance matching circuit, respectively; and a gate voltage control circuit for controlling the gate voltage of the FET in response to the power of the high-frequency signal. The gate voltage control circuit includes a diode having an anode connected to the gate, a capacitor connected between the cathode of the diode and ground, and a gate bias setting circuit connected to the junction of the diode and the capacitor. The gate bias setting circuit outputs a control voltage corresponding to the power of the high frequency signal. As a result, impedance matching by the output matching circuit is not disturbed and the linearity of the output power to the input power is maintained so that the amplifier operates highly efficiently.

3 Claims, 3 Drawing Sheets



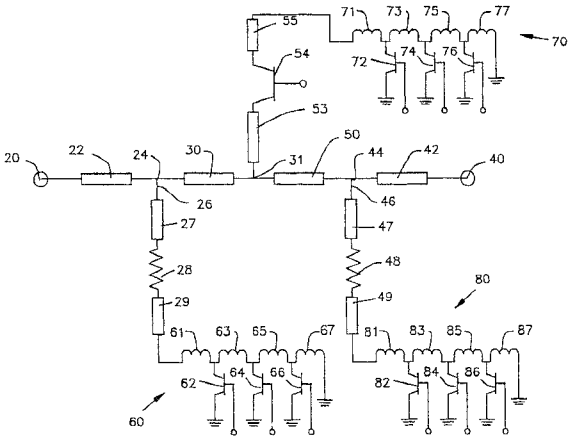
5,363,069 Nov. 8, 1994

Electronically Tunable Gain Equalizer

Inventors: Virender K. Sadhir, David A. Willems, Kenneth S. Karsten, Jr.
Assignee: ITT Corporation.
Filed: Apr. 5, 1993.

Abstract—An equalizer circuit for equalizing RF frequencies implemented as an MMIC or MIC having a series of microstrip transmission lines between an RF input terminal and an RF output terminal and having at least one shunt path comprised of a series combination of a FET able to be switched between a conducting state and a nonconducting state and a stud tuner microstrip transmission line, wherein the FET is used as a voltage variable resistor to selectively de-Q the stub tuner and thereby control the depth of the equalization curve. In a modified embodiment, artificial transmission lines that include a plurality of inductive elements and FET's are coupled to each shunt path, wherein the shunt paths may be selectively shorted by changing the state of the FET's, thereby permitting the center frequency of the equalizer circuit to be shifted as well.

16 Claims, 4 Drawing Sheets



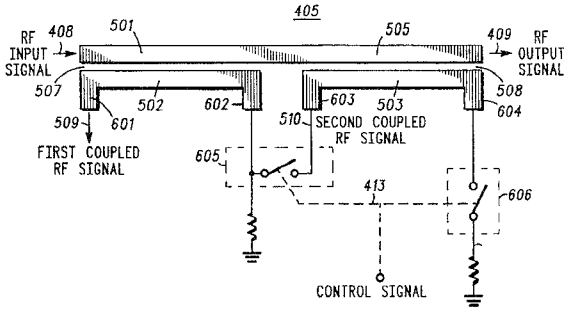
5,363,071 Nov. 8, 1994

Apparatus and Method for Varying the Coupling of a Radio Frequency Signal

Inventors: Dale G. Schwent and Rashid M. Osmani.
Assignee: Motorola, Inc.
Filed: May 4, 1993.

Abstract—An apparatus and method for varying coupling of a radio frequency (RF) signal (**408**). This is advantageously used for increasing the dynamic range of a power detector (**406**) in an automatic power level control loop (**403**) of a transmission unit (**404**), while maintaining transmission unit efficiency at higher power levels. This is accomplished by selecting between a first operating mode of the RF coupler (**405**) having strong coupling, responsive to a first predetermined power level, such that the RF coupler (**405**) produces a first coupled RF signal (**509**) responsive to the RF signal (**408**) and a second operating mode of the RF coupler (**405**) having weak coupling, responsive to a second predetermined power level, such that the RF coupler (**405**) produces a second coupled RF signal (**510**) responsive to the RF signal (**408**).

5 Claims, 3 Drawing Sheets



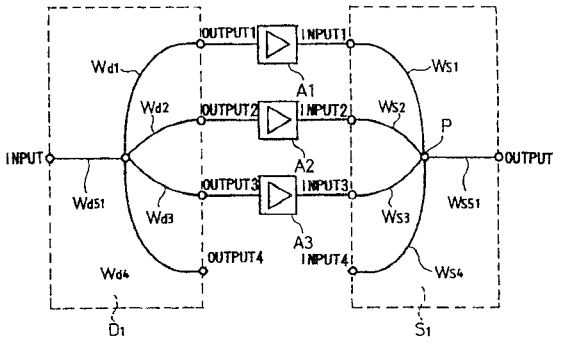
5,363,072 Nov. 8, 1994

High-Frequency Power Divider-Combiner

Inventors: Hironori Sakamoto, Akira Ito, Toshio Nojima.
Assignees: Japan Radio Co., Ltd., Nippon Telephone & Telegraph Corporation, NTT Mobile Communication Network Inc.
Filed: Oct. 23, 1992.

Abstract—In a power amplifying apparatus that has a high-frequency power divider and combiner and two to four parallel-operated power amplifiers, in which a change is made in the number of the parallel-operated power amplifiers so as to adjust output power, there are provided a power dividing circuit D_1 having a transmission line Wd_{51} serving as an impedance transformer set in such a manner that the power loss is minimized by assigning an intermediate number 3 between 2 and 4, both of which indicate the number of divisions, and having four output terminals, and a power combining circuit S_1 having a transmission line Ws_{51} serving as an impedance transformer set in such a manner that the power loss is minimized by assigning the intermediate number 3 indicative of the number of combinations, and having four input terminals.

7 Claims, 5 Drawing Sheets



5,363,221 Nov. 8, 1994

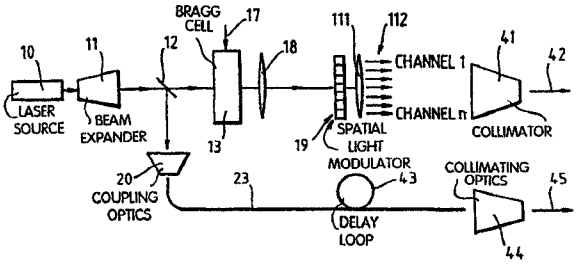
Optical Multiplexer

Inventors: Philip Sutton, Andrew P. Shaw, William Dawber, Peter F. Hirst, Brian Condon.
Assignee: The Secretary of State for Defence in her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland.
Filed: Mar. 11, 1991.

Abstract—Light from a laser (**10**) is divided by a beam splitter (**12**) to provide signal (**15**) and reference (**14**) channels. The signal channel light is expanded (**11**) to illuminate an acoustooptic (AO) device (**13**) This leads to a spatial distribution of Doppler-shifted frequencies. This spatial distribution then illuminates a spatial light modulator (SLM) (**19**) such that a number of parallel and discrete optical channels (**112**) emerge In a local area network

(LAN) the optical signal channels are coupled into a single mode optical fiber (**22**) and then heterodont to the reference laser light from a further optical fiber (**23**) in an optical coupler (**25**). In a receiver the modulated light is detected (**32**) and the detected signal connected to the transducer of an AO device (**35**). The AO device (**35**) is illuminated by a receiver laser light (**36**) and the emerging modulated light is incident on a focal plane detector array (**39**) where each detector (**310**) then receives light corresponding to each of the transmitted channels (**311**). A secure free space communications system is possible by separate transmission of a delayed (**43**) unmodulated reference signal. The receiver is then arranged to include an indentical delay (**55**) in the signal channels before coupling together the signal and reference channels (**56**) for modulating the AO cell (**35**). By this means the transmission delay lines (**43**) and the reference delay lines (**55**) must have delays which are equal within the coherence length of the source laser.

23 Claims, 4 Drawing Sheets



5,365,197 Nov. 15, 1994

Low-Noise Distributed Amplifier

Inventor: Pertti K. Ikalainen.
Assignee: Texas Instruments Incorporated.
Filed: June 30, 1993.

***Abstract*—**In one form of the invention, an amplifier is disclosed, the amplifier comprising: an input transmission line **32**; an output transmission line **36,38**; at least two active devices **134** distributed between the two transmission lines; a termination **50** connected to an end of the input transmission line **32**, the termination **50** comprising a terminating transistor **52** having a first gate terminal **150**, a drain terminal **151**, and source terminal **152**, wherein the first gate terminal **150** is connected to the input transmission line **32** and the drain terminal **151** is coupled to the first gate terminal **150** through a resistor **58** and a capacitor **56**. The termination **50** is preferably characterized by a noise temperature of less than 300° K.

20 Claims, 4 Drawing Sheets

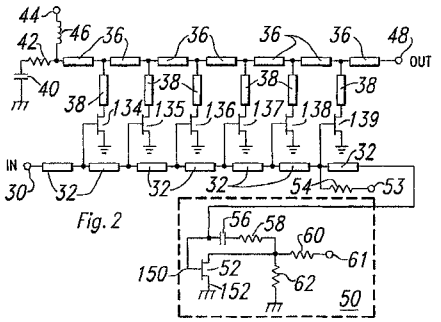


Fig. 2

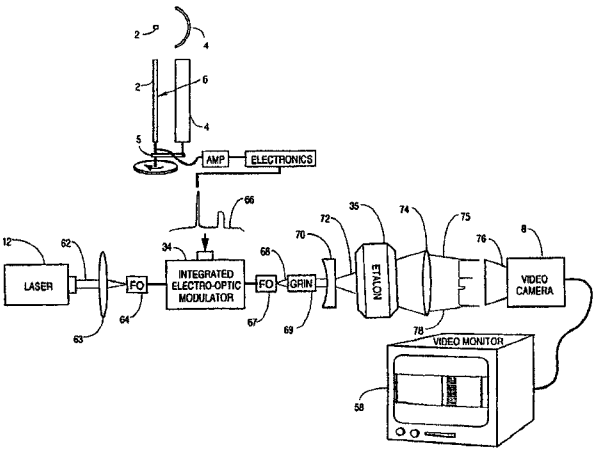
5,365,237 Nov. 15, 1994

Microwave Camera

Inventors: Paul A. Johnson, Ri-Chee Chou, Chris A. Martin, Britt Spivey, John Lovberg.
Assignee: Thermo Trex Corporation.
Filed: May 13, 1993.

***Abstract*—**A camera system in which microwave radiation from objects in a field-of-view is collected by an antenna having beam directions that are a function of the beam frequency. The collected radiation is used to modulate an optical beam to impose upon the beam spectral components, which are functions of the frequencies of the microwave radiation. The modulated beam is then analyzed by an optical spectrum analyzer to produce an image of objects in the field of view. In a simple embodiment of the invention a one-dimensional image is produced. This one-dimensional image can be converted to a two-dimensional image by panning the camera system or mounting the camera on a moving platform. In this preferred embodiment the spectrum analyzer comprises an angle-frequency filter (preferably an etalon). The portion of the modulated beam passing through the etalon is directed in a number of directions, the directions being a function of the spectral components of the modulated beam. The light passing through the etalon is focused on the aperture of a television camera to produce a one dimensional image. In another preferred embodiment an array of antennas and a corresponding number of optical modulators are used to produce a two dimensional real time image. The camera is capable of imaging objects through media such as wooden walls or fog, which are transparent to microwaves, but are opaque to visible light.

16 Claims, 13 Drawing Sheets



5,365,239 Nov. 15, 1994

Fiber-Optic Feed and Phased Array Antenna

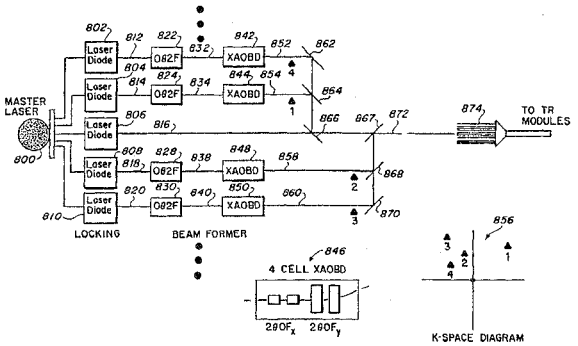
Inventor: P. Denzil Stilwell, Jr.
Assignee: The United States of America as represented by the Secretary of the Navy.
Filed: Nov. 6, 1991.

***Abstract*—**A fiber-optic feed includes an optical circuit for providing at least one optical output signal modulated according to an RF source and an antenna interface for demodulating the at least one optical output signal and communicating with an antenna, wherein the optical circuit includes a coherent light source, an interferometer driven by the coherent light source for synthesizing a plurality of independently controlled planar beams, an optic modulator for frequency modulating at least one of the independently controlled planar beams according to the RF source, and an optic pickup for producing the at least one optical output signal according to a superposition of the plurality of independently controlled planar beams, wherein the interferometer includes at least one beam deflector for angularly deflecting at least one of the plurality of independently controlled beams according to a beam control command.

A phased array antenna includes an optical circuit for providing at least one optical output signal modulated according to an RF source and an antenna module for demodulating the at least one optical output signal and communicating with at least one RF radiating element, wherein the optical circuit includes a coherent light source, an interferometer driven by the coherent light source for synthesizing a plurality of independently controlled planar beams, an optic modulator for frequency modulating at least one of the independently controlled planar beams according to the RF source, and

an optic pickup for producing the at least one optical output signal according to a superposition of the plurality of independently controlled planar beams, wherein the interferometer includes at least one beam deflector for angularly deflecting at least one of the plurality of independently controlled planar beams according to a beam control command.

34 Claims, 35 Drawing Sheets



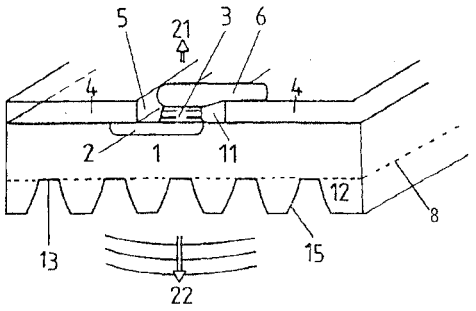
5,365,243 Nov. 15, 1994

Planar Waveguide for Integrated Transmitter and Receiver Circuits

Inventors: Josef Büchler and Erich Kasper.
Assignee: Daimler-Benz Aktiengesellschaft.
Filed: June 15, 1992.

***Abstract*—**A planar waveguide structure for mm-wave transmitters and receivers. The active semiconductor component elements and the planar waveguide with which they are connected of the transmitters and/or receivers are arranged on the front side of a semiconductor substrate. The rear side or surface of the semiconductor substrate is at least partially formed as an inwardly or outwardly radiating surface and is geometrically shaped such that an electromagnetic property incident or emanating radiation is altered in a predetermined manner.

14 Claims, 1 Drawing Sheet



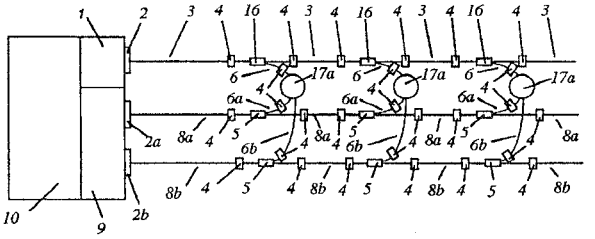
5,365,359 Nov. 15, 1994

Method for Electrically Passive Self-Routing Optical Multiplexing

Inventor: William B. Spillman, Jr.
Assignee: Catamount Scientific, Inc.
Filed: May 14, 1993.

***Abstract*—**What is hereof proffered is a method and apparatus for optically multiplexing together a plurality of optical modulation devices on a limited number of optical transmission paths utilizing electrically passive photo-activated optical switches. The switches have the characteristic that prior to illumination, an input channel is coupled to a specific output channel. Following illumination, after a characteristic time delay, t, a first switch activates so that the input channel is disconnected from the first output channel and connected to a second output channel. It remains connected to the second output channel until the illumination is removed, at which time the input channel is disconnected from the second output channel and reconnected to the first output channel. The switches are arranged sequentially along an outwardly directed optical transmission path. When optical power is coupled into the path, as it reaches each switch, the total power is sequentially switched off the path into alternate optical transmission paths and then coupled back onto the outwardly directed optical transmission path. An optical modulator on each alternate optical transmission path modulates the optical signal through it. The modulated optical signals are directed to a signal processing location along one or more inwardly directed optical transmissions paths. At the signal processing location, time windowing demodulates the signals from each modulation device.

13 Claims, 5 Drawing Sheets



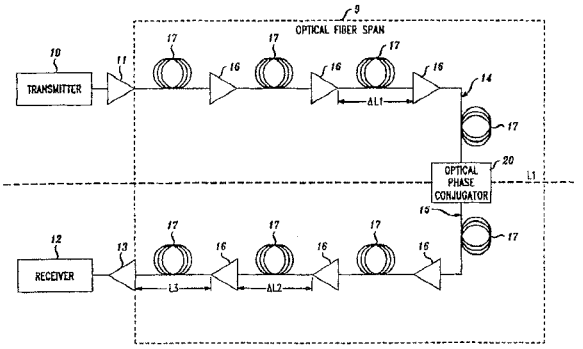
5,365,362 Nov. 15, 1994

Ultra-High Capacity Nonsoliton Optical Transmission Using Optical Phase Conjugation

Inventors: Alan H. Gnauck and Christian Kurtzke.
Assignee: AT&T Bell Laboratories.
Filed: Sept. 10, 1993.

***Abstract*—**The present invention provides an apparatus and method for achieving bit rate distance products on the order of 200 Tbits/s-km in nonsoliton optical communication using optical phase conjugation. The apparatus and method utilize phase conjugation and adjustments of in-line amplifier number, spacing, and/or output power in order to compensate for the interaction between first-order dispersion and fiber nonlinearity dispersion effects in an optical fiber span. The present invention provides additional techniques for adjusting system parameters, such as dispersion-length products of first and second portions of the fiber span, in order to compensate for changes in first-order dispersion resulting from nonzero second-order dispersion. The method and apparatus also provide an improved multichannel optical phase conjugation system design.

20 Claims, 5 Drawing Sheets



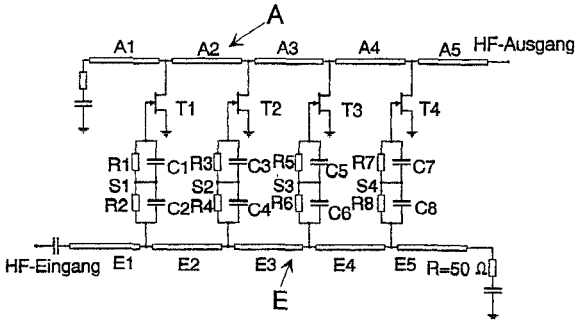
5,367,267 Nov. 22, 1994

Broadband Amplifier Having Individual Input Circuits with Pluralities of Capacitors and Resistors

Inventor: Hans-Peter Fuchs.
Assignee: Rohde & Schwarz GmbH & Co., KG.
Filed: Apr. 7, 1993.

Abstract—In a broadband amplifier having an upper limit frequency of several GHz that is composed of a plurality of transistors connected in parallel, the control terminals (gates) of the transistors are respectively connected to line sections of an input line via an input circuit composed of a plurality of capacitors and appertaining resistors connected in parallel. Outputs (drain terminals) of the transistors are respectively connected to line sections of an output line.

7 Claims, 1 Drawing Sheet



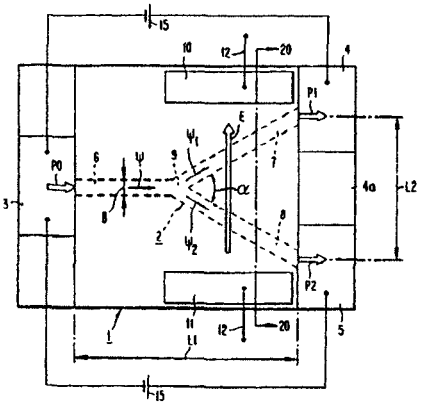
5,367,274 Nov. 22, 1994

Quantum Wave Guiding Electronic Switch

Inventor: Lars H. Thylén.
Assignee: Telefonaktiebolaget L M Ericsson.
Filed: June 26, 1992.

Abstract—A quantum wave guiding electronic switch includes a substrate that carries electron waveguides disposed in a fork-like configuration. Each of these electron waveguides is connected to a respective electron reservoir. Electrons are driven through the waveguides by voltage sources. Electrodes on the substrate generate an electric field that passes through the outgoing electron waveguides of the switch and creates a potential difference therebetween. In one case, in which the electrons are transported ballistically, in the absence of electron scattering, this potential difference creates a phase mismatch between the outputs. An incident electron wave function having even parity is herewith switched to a quasi even electron wave function in the output that has the lowest energetic potential. When transportation is not ballistic and the electrons scattered to some extent, switching is effected by relaxation of incoming electrons to lower energy levels. The electrons will have a higher probability to be conducted through the output that has the lowest potential. The two switching cases may occur simultaneously in part. The switch is digital and requires very little control energy. Electrons within a broad energy range are switched and the switch has small or no losses.

16 Claims, 5 Drawing Sheets



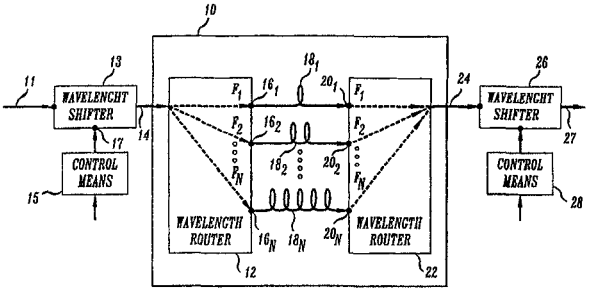
5,367,586 Nov. 22, 1994

Optical Delay Line

Inventors: Bernard Glance and Robert W. Wilson.
Assignee: AT&T Bell Laboratories.
Filed: Mar. 26, 1993.

Abstract—A variable optical delay line that can delay an optical signal by a selected interval of time comprises an input wavelength router connected to an output wavelength router by means of optical waveguides of different lengths. A wavelength shifter coupled to the input of the input wavelength router shifts the wavelength of the received signal to a desired wavelength. Depending on the wavelength of the signal from the wavelength shifter, the received signal is directed to a specific one of the waveguides of different lengths to provide a delay that is controllable. The output wavelength router directs the optical signals from the various waveguides of different lengths to a common output waveguide.

7 Claims, 2 Drawing Sheets



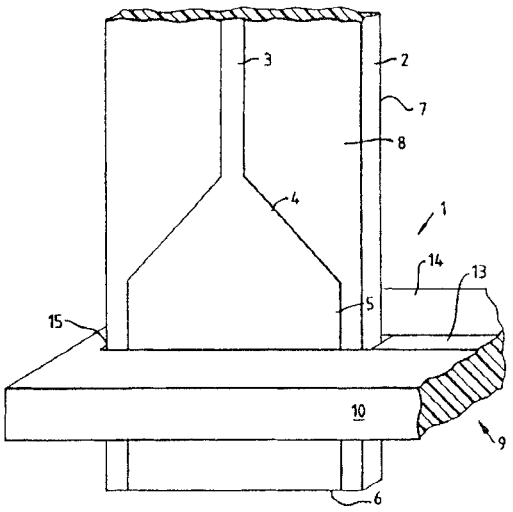
5,369,380 Nov. 29, 1994

Microwave Connector

Inventors: Gregory J. Ball, Michael Dean, Andrew L. Hume.
Assignee: The Secretary of State of Defence in Her Majesty's Government of the United Kingdom of Great Britain and Northern Ireland of Defence Research Agency.
Filed: Dec. 19, 1991.

Abstract—A microwave connector comprises two substrates arranged in orthogonal planes. A first substrate (**2**) is formed as a microstrip system (**8**) with a microstrip component (**3**) connected via a quarter wavelength taper (**4**) to a parallel transmission line (**5**). This transmission line terminates in a short circuit (**15**) to a ground electrode (**7**) on the back of the microstrip. A second substrate (**10**) is formed as a slotline system (**9**) having a slotline (**13**) between two sheet electrodes (**14**). In this slotline is a slot (**16**) of dimensions slightly less than the slotline width and sufficient length to accommodate the microstrip. The microstrip and slotline are electrically unconnected. Energy transfer between microstrip and slotline, or vice versa, takes place by electromagnetic coupling between the transmission line and the edges of the slotline. The slotline may be formed with an additional substrate and slotline electrode in a triplate configuration. Several microstrip components (8_1 to 8_n) may be connected in a single slotline substrate (**10**, **13**).

5 Claims, 4 Drawing Sheets



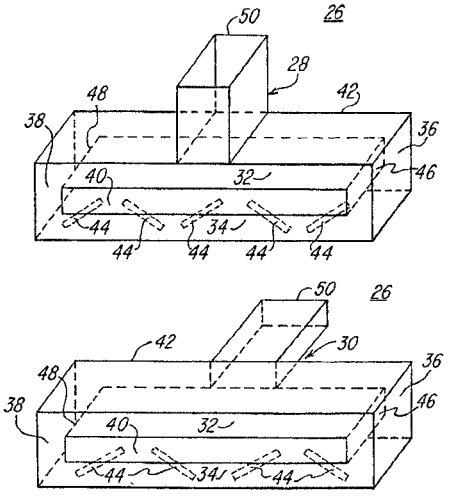
5,369,414 Nov. 29, 1994

Dual End Resonant Array Antenna Feed Having a Septum

Inventors: Hung Y. Yee and Phillip N. Richardson.
Assignee: Texas Instruments Incorporated.
Filed: Aug. 30, 1993.

Abstract—An antenna **10** with a dual end resonant slot array feed **26** improves the bandwidth performance of a resonant slotted waveguide planar array antenna **10**. The dual-end resonant slot array feed **26** includes a tee junction **28/30**, which may be either an E-plane **28** or H-plane **30**, two waveguide sections **32**, **34** and two E-plane waveguide bends **36**, **38**. The two waveguide sections **32**, **34** are formed by a septum **40** mounted in a slotted waveguide **42** for separating the input tee junction **38**, **30** from the slots **44** of the slotted waveguide. The ends of the septum **40** coacting with the ends of the waveguide to form the E-plane waveguide beds **36**, **38**. Thus, resonant feeding of the series-slot waveguides **50** is achieved by the opposing traveling waves thereby eliminating the need to use resonant short circuits, cavities or folded short circuits. Further direct coupling to the series slots **44** directly adjacent to the E- **28** or H-plane **30** feed point **50** is avoided by introducing the septum **40** between the feed point **50** and the row of slots **44**.

6 Claims, 7 Drawing Sheets



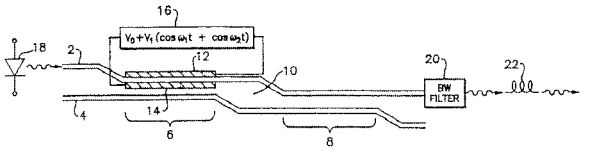
5,369,522 Nov. 29, 1994

Modulation System and Method with Third-Order Intermodulation Distortion Reduction

Inventors: Gregory L. Tangonan and Juan F. Lam.
Assignee: Hughes Aircraft Company.
Filed: June 3, 1992.

Abstract—When an optical signal is modulated at two modulation frequencies, third-order intermodulation distortion (IMD) is eliminated by inducing an out-of-phase signal that is complementary to the modulated signal, and cross-coupling the two signals with each other to remove the third-order terms. An optical beam in a first waveguide is electrooptically modulated and coupled with a second waveguide to induce the out-of-phase complementary beam therein. A second optical coupler is provided that cross-couples the beams in the two waveguides downstream from the first optical coupler. The optical coupling coefficients, the coupler lengths, and the differential between the optical propagation coefficients of the two waveguides within the first coupler are selected empirically to substantially negate third order IMD. The differential in propagation coefficients is established by the DC bias of the modulation signal Enhanced linearity can be obtained by inducing a compensating phase shift either in the second optical coupler, or between the first and second optical couplers

20 Claims, 8 Drawing Sheets



5,369,718 Nov. 29, 1994

Total Internal Reflection-Type Optical Waveguide Switch

Inventors: Yoshiyuki Kamata and Hisaharu Yanagawa.
Assignee: The Furukawa Electric Co., Ltd.
Filed: Oct. 13, 1992.

Abstract—In a total internal reflection-type optical waveguide switch that comprises optical waveguides crossing each other so that a refractive index changing region for developing a reflective surface is formed at a crossing section between the waveguides, the refractive index changing region has a configuration such that the reflective surface constitutes a concave surface recessed with respect to one lateral portion of the crossing section. When the refractive index changing region is not activated, incident light upon the spot corresponding to the reflective surface is insensitive to changes of the refractive index in the refractive index changing region, so that the initial crosstalk level can be lowered.

30 Claims, 6 Drawing Sheets