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.

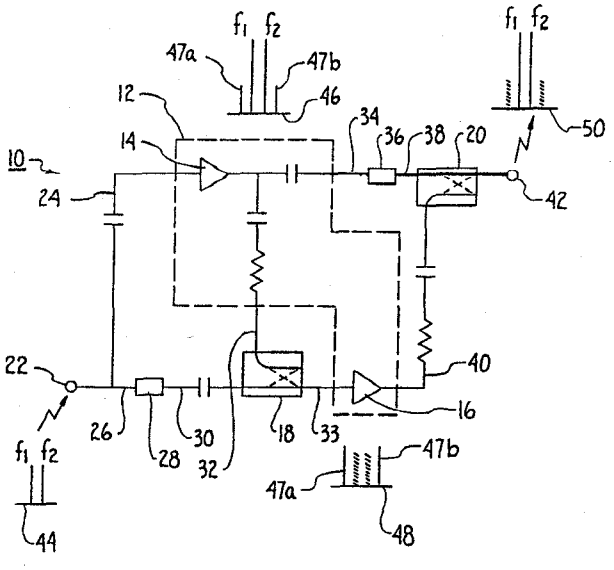
5,160,895 Nov. 3, 1992

MMIC Amplifier with Extended Dynamic Range and Low Distortion

Inventors: Ronald T. Siddoway and Vaughn H. Estrick.
Assignee: Hughes Aircraft Company.
Filed: Apr. 11, 1991.

Abstract—A Monolithic Microwave Integrated Circuit (MMIC) amplifier with extended dynamic range includes a base circuit for receiving both a first input signal, which is the signal to be amplified, and an amplifier generated second input signal. A power amplifier in the base circuit directly receives and amplifies the first input signal, with some unavoidable distortion to the first input signal. A first directional coupler is connected with the base circuit to couple the output of the power amplifier with the first input signal to cancel the first input signal component from the output of the power amplifier and generate the second input signal which is only distortion. This distortion is then amplified by an error amplifier in the base circuit, and the output of the error amplifier is coupled with the output of the power amplifier through a second directional coupler. This coupling at the second directional coupler cancels the distortion from the output of the power amplifier to provide the desired amplified signal.

1 Claim, 1 Drawing Sheet



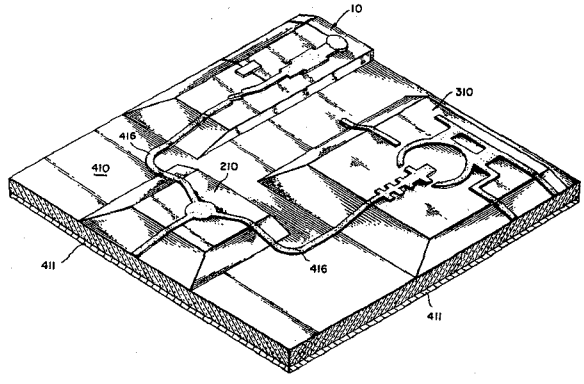
5,160,904 Nov. 3, 1992

Microstrip Circuit with Transition for Different Dielectric Materials

Inventors: Richard W. Babbitt and Richard A. Stern.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: Nov. 7, 1991.

Abstract—A composite microstrip circuit with the plurality of discrete microstrip components made from materials having different dielectric constants mounted thereon. A transitional taper is formed on each discrete microstrip component at the point where a connection is made between other components or devices. The base on which the discrete microstrip components are positioned has a dielectric constant lower than any of the dielectric constants of the discrete components. The transitional taper results in a low cost, low loss interconnection between discrete microstrip components.

1 Claim, 5 Drawing Sheets



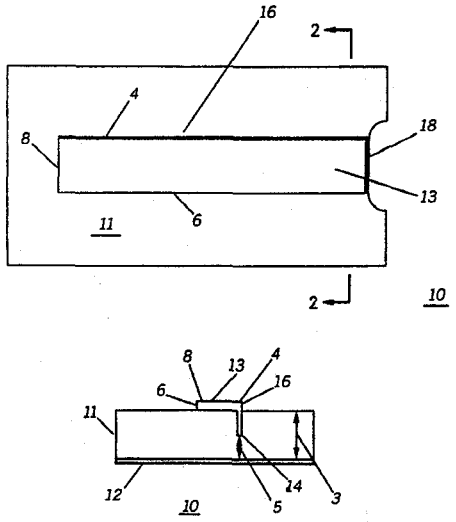
5, 160,906 Nov. 3, 1992

Microstripe Filter Having Edge Flared Structures

Inventors: John R. Siomkos and Philip M. Huang.
Assignee: Motorola, Inc.
Filed: June 24, 1991.

Abstract—A transmission line structure comprises a dielectric substrate (11) having first and second opposing sides separated by a first distance (3). A transmission line (13) is disposed on the first side while an opposed conductor (12) is disposed on the second side. The transmission line (13) has a first edge (4) a second edge (6), and a middle portion (8). Thicknesswise, the middle portion (8) is separated from the opposed conductor by the first distance (3), and at least a portion of the first edge (4) is separated from the opposed conductor by a second distance less than the first distance (3).

8 Claims, 2 Drawing Sheets



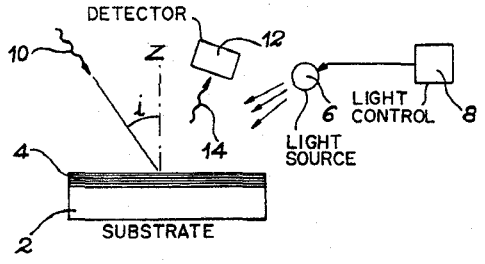
5,160,992 Nov. 3, 1992

Device for the Conversion of An Infrared Radiation Into Another Radiation of Energy Greater Than That of This Infrared Radiation

Inventors: Jean-Michel Gerard and Jean-Yves Marzin.
Assignee: Minister of Post, Telecommunications and Space.
Filed: Oct. 31, 1990.

***Abstract*—**A device for the conversion of infrared radiation into another form of radiation of energy greater than that of the infrared radiation comprises a multilayer semiconductor structure (4) comprising at least two layers in which an electron gas and a gas of holes which are regenerated in the course of the use of the device are combined. There is at least one delocalized electron state in the structure, at an energy greater than the energy of the ground state of the electron gas, the difference between these energies being within the infrared range. When the structure is illuminated at a non-normal incidence by radiation (10), the energy of which is equal to this difference, the structure emits a radiation (14) of greater energy, by radiative recombination involving the holes. The device finds suitable application in infrared imaging systems.

21 Claims, 6 Drawing Sheets



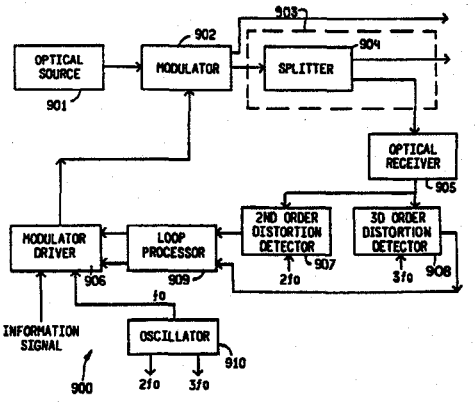
5,161,044 Nov. 3, 1992

Optical Transmitters Linearized By Means of Parametric Feedback

Inventors: Moshe Nazarathy, Josef Berger, and Yishai Kagan.
Assignee: Harmonic Lightwaves, Inc.
Filed: Apr. 15, 1991.

***Abstract*—**The invention discloses a general technique of taking advantage of the stability of the modulator transfer characteristic in order to correct for second and third order distortion. These objectives are achieved in a way compatible with the nature of the video distribution frequency formats. The method if this invention for linearizing the amplitude transfer characteristic of integrated optic devices for analog transmission is accomplished by injecting pilot signals, monitoring the harmonic and intermodulation distortion content of the optical output, and feeding back bias signals to parametrically tune the operating points of the integrated optic modulator and of a predistortion network. General principles for realizing suitable parametrically tunable predistortion networks are also presented.

50 Claims, 12 Drawing Sheets



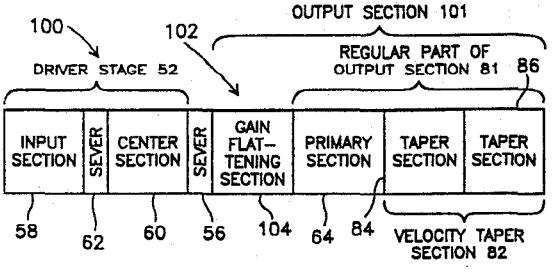
5,162,697 Nov. 10, 1992

Traveling Wave Tube with Gain Flattening Slow Wave Structure

Inventors: Jon A. Davis and Ivo Tammaru.
Assignee: Hughes Aircraft Company.
Filed: Aug. 6, 1990.

***Abstract*—**A traveling wave tube (10) includes a coupled cavity type slow wave structure (100) having a driver stage (52) and an output section (101) with a primary section (64) and a velocity taper section (82) which in combination produce maximum signal gain at a predetermined frequency. A gain flattening section (104) is preferably disposed between the driver stage (52) and the primary section (64) of the output section (101), and is designed to operate at a reduced phase velocity selected to produce minimum or negative signal gain at approximately the predetermined frequency. The gain characteristics of the driver stage (52), gain flattening section (104), primary section (64), and velocity taper section (82) combine to produce minimum signal gain variation over an operating frequency range which spans the predetermined frequency, and expand the bandwidth of the traveling wave tube (10).

27 Claims, 5 Drawing Sheets



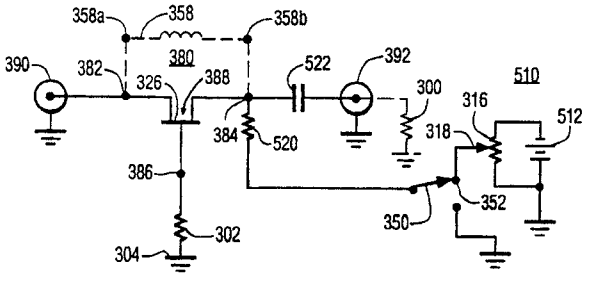
5,162,748 Nov. 10, 1992

Switchable FET Distortion Generator

Inventors: Allen Katz.
Assignee: General Electric Company.
Filed: Nov. 29, 1991.

Abstract—A communications system includes a transmission channel in which, for efficiency, a processor such as an amplifier is operated in a nonlinear mode. When the signal is modulated in a manner which is affected by the nonlinearity of the processor, such as a multicarrier modulation, a distortion linearizer is used. The distortion linearizer includes the source-to-drain conductive channel of a FET. The gate of the FET is coupled to ground by an impedance which may be a low inductance, and the gate is biased relative to the channel, possibly near pinchoff, to cause the channel to exhibit desirable gain expansion and phase shifts in response to signal input level, which are selected to compensate the distortion of the nonlinear processor. When the signal is modulated in a manner which is not significantly affected by the nonlinearity of the processor, as for example frequency modulation, the distortion linearizer is switched to a linear or ON mode, in which the amplitude and phase are invariant with signal level. The switching is accomplished by adjusting the gate-to-channel voltage.

6 Claims, 4 Drawing Sheets



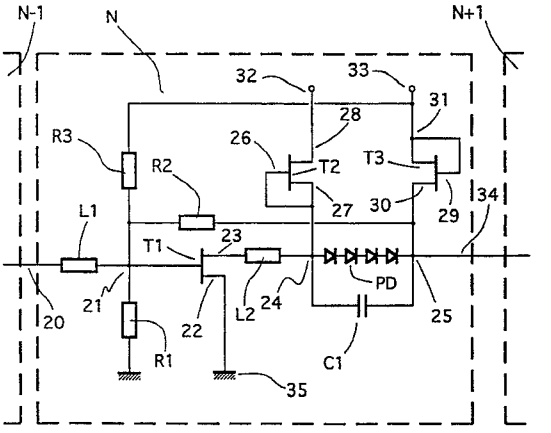
5,162,754 Nov. 10, 1992

Ultra-Wideband DC-Microwave Amplifier Device Notably in Integrated Circuit Form

Inventors: Robert Soares, Serge Mottet, Georges Follot, and Andre Perennec.
Assignee: France Telecom (CNET).
Filed: Apr. 29, 1991.

Abstract—An amplification device relating to the field of the amplification of ultra-wideband electrical signals from the dc to the microwave range, and more precisely from dc to microwaves of over 6 GHz, notably for the amplification of signals transmitted at very high bit rates on optic fibers, of the type including at least one amplification stage, the active amplification element of which is a field-effect transistor mounted as a common source, each of the amplification stages including means for the simultaneous maintaining of a positive dc voltage bias on the drain of the amplification transistor and a negative or zero dc bias on the gate of the transistor. This device may advantageously be made in monolithic integrated circuit form.

28 Claims, 3 Drawing Sheets



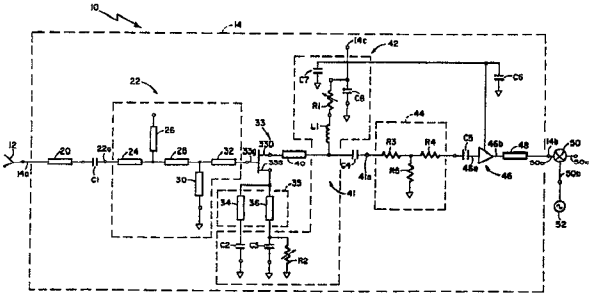
5,162,755 Nov. 10, 1992

Radio Frequency Amplifier Circuit

Inventors: John F. Mara, Jr., Mark E. Russell, and Russell W. Hansen.
Assignee: Raytheon Company.
Filed: Oct. 29, 1991.

Abstract—A radio frequency (RF) amplifier circuit includes an input matching network having a first port coupled to an input port of the circuit. The RF amplifier circuit further includes a high electron mobility field effect transistor (HEMT) having source, gate and drain electrodes with the gate electrode coupled to the second port of the input impedance matching network and means, coupled between the source electrode and a DC reference potential, for providing inductive feedback to the source electrode of the HEMT. The RF amplifier circuit further includes an output matching network having a first port coupled to the drain electrode of the HEMT. The output matching network comprises a first RF propagation network having a first end coupled to the first port of the output matching network and a second end coupled to a first electrode of a capacitor. A second electrode of the capacitor is coupled to a second port of the output matching network. The RF amplifier circuit further includes a monolithic microwave integrated circuit amplifier having an input port coupled to the second port of the output matching network and having an output port coupled to an output port of the RF amplifier circuit.

4 Claims, 2 Drawing Sheets



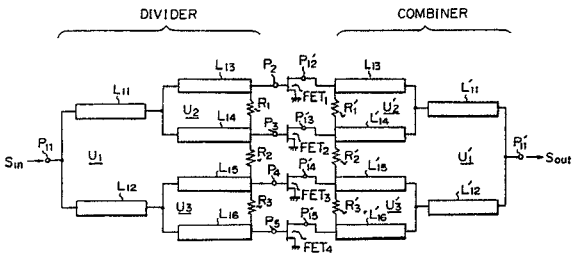
5,162,756 Nov. 10, 1992

High Frequency Transmission Line Circuit

Inventors: Yasuichi Taniguchi and Shintaro Takase.
Assignee: Fujitsu Limited.
Filed: Oct. 18, 1990.

Abstract—A high frequency transmission line circuit including a plurality of units each constituting two transmission lines connected in common through one end of each, the other ends being independent, one end of a latter stage of units being connected to the other ends of a former stage so as to form a tournament configuration, the length of the transmission lines being made less than $\lambda/4$ (λ being one wavelength of a frequency of a high frequency signal), and the characteristic impedances of the transmission lines in units at an end side of the tournament are set larger than the characteristic impedances of the transmission lines in the units at the peak side of the tournament such that each two parallely arranged adjoining units at the end side of the tournament configuration are joined, at their commonly connected ends, to the adjoining unit at the peak side thereof, so as to reduce the total length of the device.

8 Claims, 7 Drawing Sheets



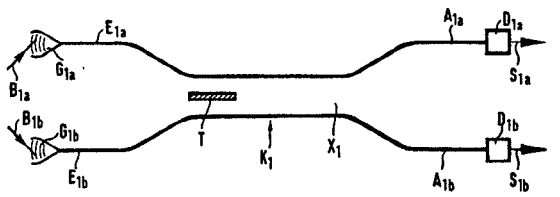
5,162,869 Nov. 10, 1992

Apparatus and Method Having At Least One Waveguide Coupler to Create At Least Two Signals Having a Mutual Phase Shift Not Equal To 180 Degrees

Inventors: Dieter Michel and Andreas Franz.
Assignee: Johannes Heidenhain GmbH.
Filed: Dec. 21, 1990.

Abstract—In an arrangement with at least one waveguide coupler, two photo beam bundles are supplied to both of the inputs of the waveguide coupler by two input grids and are brought to interference in the coupling area. A damping element is provided in the coupling area of the waveguide coupler for obtaining at the two outputs two signals having a mutual phase shift of other than 180° by two detectors.

13 Claims, 1 Drawing Sheet



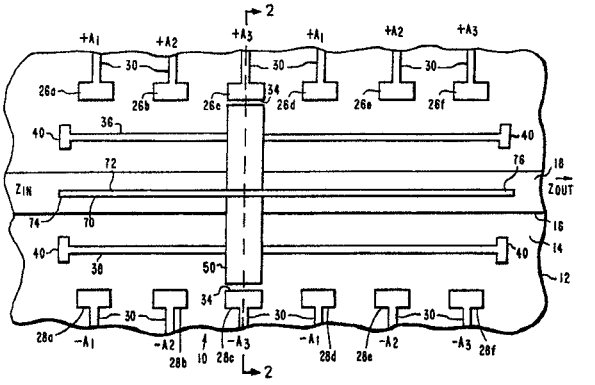
5,164,688 Nov. 17, 1992

Miniature Microwave and Millimeter Wave Tuner

Inventors: Lawrence E. Larson.
Assignee: Hughes Aircraft Company.
Filed: May 31, 1991.

Abstract—A miniature, electrostatically actuated, stub tuner which is operable to dynamically tune a transmission line in response to control signals. With the use of integrated circuit processing the transmission line is fabricated on a substrate and at least one stub tuner is fabricated over the substrate and is movable relative to the transmission line in response to electrostatic fields produced when the control signals are selectively applied to rows of control electrodes.

21 Claims, 4 Drawing Sheets



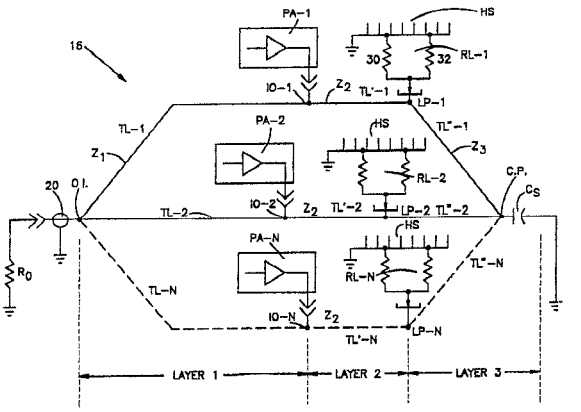
5,164,689 Nov. 17, 1992

N-Way Power Combiner/Divider

Inventors: Robert J. Plonka.
Assignee: Harris Corporation.
Filed: Apr. 11, 1991.

Abstract—There is presented herein an N-way power combiner/divider and which includes a common output/input port, a plurality of N input/output ports together with N load ports. N transmission lines interconnect the common output\input port with the N input\output ports. A second plurality of N transmission lines interconnect the respective input/output ports with respective ones of the N load ports. Also, a third plurality of N transmission lines interconnect each of the load ports with a common point and which is, in turn, connected to ground by a capacitor. A first plurality of transmission lines and a second plurality of transmission lines include a plurality of metal foil traces respectively mounted on first and second insulator boards which are spaced from each other. At least three metal layers are provided which are electrically connected together and which serve as ground planes. These layers are spaced from and are parallel to the insulator boards such that the first insulator board is located between the first and second metal layers and the second insulator board is located between second and third metal layers. N electrical connecting pins are provided with each located at one of the N input/output ports. These pins extend between the first and second boards for electrically interconnecting transmission lines on different insulator boards.

13 Claims, 8 Drawing Sheets



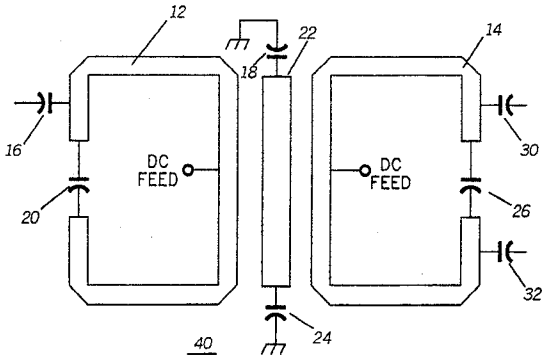
5,164,690 Nov. 17, 1992

Multi-Pole Split Ring Resonator Bandpass Filter

Inventors: Peter J. Yeh, Branko Avanic, and Leng H. Ooi.
Assignee: Motorola, Inc.
Filed: June 24, 1991.

Abstract—A multipole bandpass filter (40) comprises a first microstrip split-ring resonator (12), having at least a first edge and a second edge, the first edge having a gap (20) therein, and an input. The bandpass filter (40) also comprises a second microstrip split-ring resonator (14), having at least a first edge and a second edge, the second edge of the second microstrip split-ring resonator comprising a gap (26) therein and a balanced output (30, 32). The bandpass filter also includes at least one straight line quasi-combline resonator (22), disposed between the first microstrip split-ring resonator, and the second microstrip split-ring resonator.

15 Claims, 3 Drawing Sheets



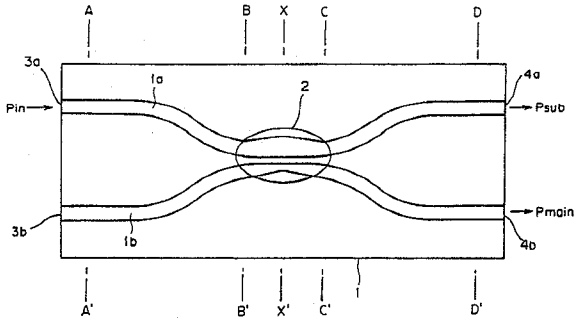
5,165,001 Nov. 17, 1992

Guided-Wave Optical Branching Device

Inventors: Akihiro Takagi, Masao Kawachi, and Kaname Jinguji.
Assignee: Nippon Telegraph and Telephone Corporation.
Filed: Apr. 15, 1991.

Abstract—A guided-wave optical branching device having optical waveguides disposed on a substrate. The waveguides are partially arranged to be close to each other to form a tapered directional coupler in which the waveguides are point symmetrical or line symmetrical. Alternatively, the waveguides are neither line symmetrical nor point symmetrical. The tapered directional coupler reduces the wavelength dependence of the coupling ratio of the output power derived from the branching device. The widths of the waveguides in the parallel coupling region, the length of the coupling region in the symmetrical or asymmetrical directional coupler, the asymmetrical parameters or the like are set at values determined in accordance with the wavelength range used, so that the wavelength dependence of the coupling ratio of the power between the input port and the output port is reduced in a desired wavelength range, for example, 1.2 μm–1.8 μm.

13 Claims, 39 Drawing Sheets



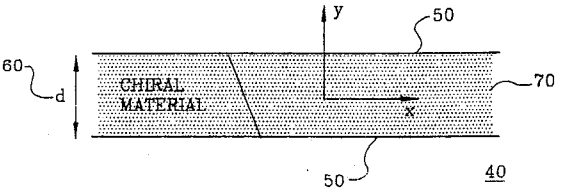
5,165,059 Nov. 17, 1992

Waveguide Using Chiral Materials

Inventors: Nader Engheta and Dwight L. Jaggard.
Assignee: The Trustees of the University of Pennsylvania.
Filed: July 22, 1991.

Abstract—Guided-wave structures comprising chiral materials. Guided-wave structures provided in accordance with this invention comprise chiral materials wherein bifurcated electromagnetic modes are allowed. The guided-wave structures are particularly useful for directional couplers, switches and modulators.

5 Claims, 3 Drawing Sheets



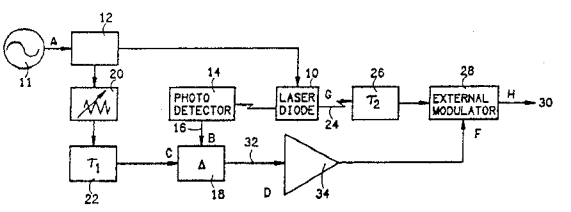
5,166,509 Nov. 24, 1992

Optical Modulator Noise Nonlinearity Reduction Circuit

Inventors: Mark E. Curran.
Assignee: Tacan Corporation.
Filed: Nov. 9, 1990.

Abstract—An optical modulator or laser source has a detector for detecting its output signal and for producing a corresponding output signal. A tapping device is connected to tap off a portion of the input modulation signal as a reference signal. The reference signal is compared and substrated from the detector output signal by a subtraction unit in order to produce an error output signal which will be proportional to the laser noise/distortion components. This error signal is amplified and connected to an external modulator linked to the laser optical output and intensity modulates the laser output signal by the error signal in order to reduce or cancel the noise and distortion components in the signal.

10 Claims, 2 Drawing Sheets



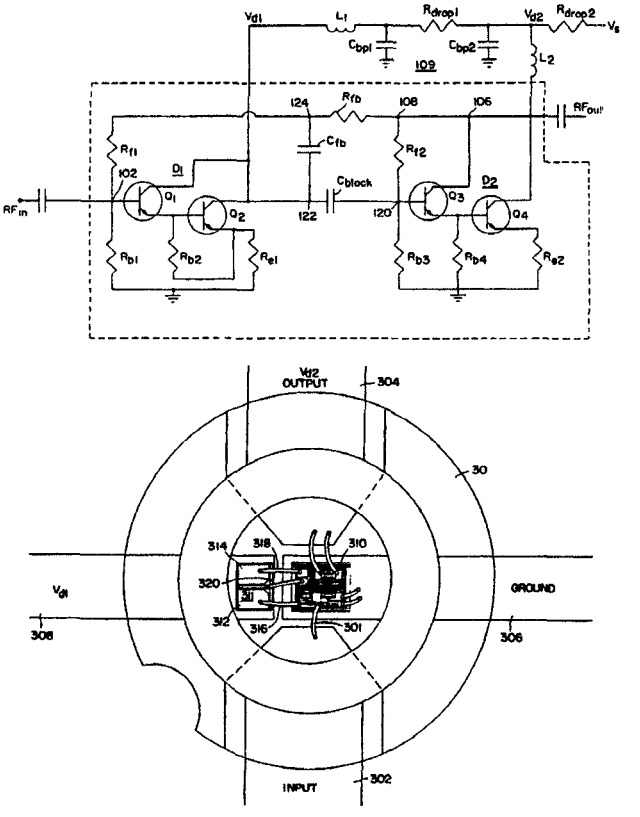
5,166,634 Nov. 24, 1992

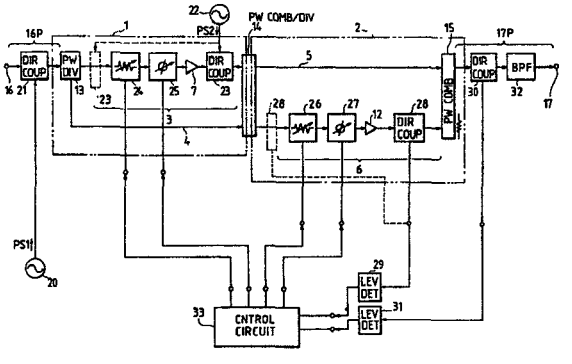
Feed-Forward Amplifier

Inventors: Shoichi Narahashi, Toshio Nojima, Makoto Maeta, and Kazuaki Murota.
Assignee: Nippon Telegraph and Telephone Corporation.
Filed: July 10, 1991.

Abstract—In a feed-forward amplifier which has an error detection circuit for detecting a nonlinear distortion component of a main amplifier and an error rejection circuit for amplifying the detected distortion component by an auxiliary amplifier and injecting it into the main amplifier to cancel an error component, a first pilot signal is injected into a signal input path and a second pilot signal is injected into a signal amplification path of the error detection circuit. A first variable attenuator and a first variable phase shifter of the error detection circuit are adjusted by a control circuit so that the level of the first pilot signal component on an error injection path of the error rejection circuit decreases to minimum. A second variable attenuator and a second variable phase shifter of the error rejection circuit are adjusted by the control circuit so that the level of the second pilot signal component on a signal output path decreases to a minimum. The first pilot signal component which appears on the signal output path is rejected by a filter or cancelled by supplying the error injection path or signal output path with the first pilot signal after adjusting its amplitude and phase. Alternatively, the frequency of the first pilot signal to be injected into the signal input path is spread to lower the level of the first pilot signal per unit spectrum which appears on the signal output path.

34 Claims, 15 Drawing Sheets





5,166,639 Nov. 24, 1992

High Gain Mololithic Microwave Integrated Circuit Amplifier

Inventors: Ronald P. Green and David M. Osika.
Assignee: SGS-Thomson Microelectronics, Inc.
Filed: Oct. 29, 1991.

Abstract—Linear high gain (greater than 20 dB) and high power (greater than +20 dbm) devices for RF power amplifiers are achieved using either fully monolithic or hybridized versions of silicon MMIC two-stage cascaded amplifiers. The device features three feedback loops in conjunction with a DC biasing network. Resistor-capacitor feedback circuits utilize only two capacitive elements which are provided as a single three-terminal element having a common lower plate.

8 Claims, 3 Drawing Sheets

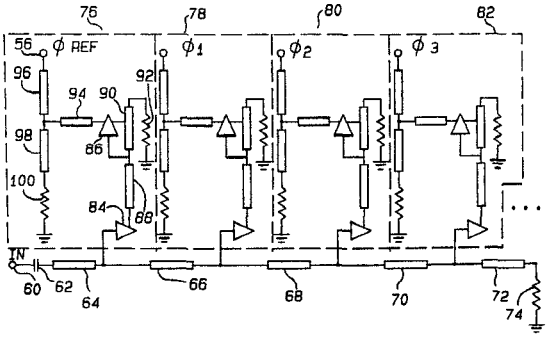
5,166,640 Nov. 24, 1992

Two Dimensional Distributed Amplifier Having Multiple Phase Shifted Outputs

Inventors: Mohammed A. Fathimulla and Warren P. Reif.
Assignee: Allied-Signal Inc.
Filed: Aug. 1, 1991.

Abstract—A two dimensional distributed amplifier phase shifter having a distributed reference amplifier circuit generating a reference signal, the reference amplifier circuit having its input connected to one end of a plurality of serially connected microstrip transmission lines. The phase shifter further has a plurality of phase shifted amplifier circuits, one associated with each of the microstrip transmission lines. Each phase shifted amplifier circuit has an input connected to an end of its associated microstrip transmission line which is opposite the reference amplifier circuit and generates an output signal, phase shifted from the reference signal or the output signal of an adjacent phase shifted amplifier by a predetermined phase angle. The phase shifter may be fabricated as a monolithic microwave integrated circuit.

21 Claims, 5 Drawing Sheets



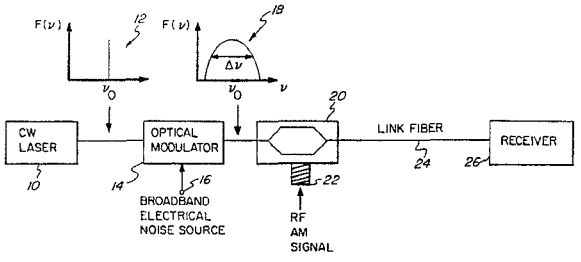
5,166,821 Nov. 24, 1992

Reduction of Non-Linear Effects in Optical Fiber Communication Systems and Method of Using Same

Inventors: David R. Huber.
Assignee: General Instrument Corporation.
Filed: Mar. 12, 1991.

***Abstract*—Non-linear effects in an optical fiber used for communicating AM signals at high power levels are reduced by increasing the linewidth of the pump laser output signal. The linewidth can be increased by optically broadening the laser output signal by driving an optical angle modulator with broadband electrical noise. The optical pump signal is then externally modulated with an AM information signal for transmission over an optical link fiber. The optical modulation can be provided using either an FM or PM optical modulator. A desired line-width can be provided by controlling the optical modulation index during the optical modulation step and/or by controlling the bandwidth of the noise source.**

20 Claims, 1 Drawing Sheet



5,166,992 Nov. 24, 1992

Wavelength Selective Optical Waveguide Coupler

Inventors: Stephen A. Cassidy and Peter Yennadhiou.
Assignee: British Telecommunications public limited company.
Filed: June 7, 1989.

***Abstract*—A wavelength selective optical waveguide coupler (1) comprises a first undulatory optical D-fiber (2) and a second optical D-fiber (4) embedded in respective substrates (4,8). The fibers (2,6) are located adjacent one another, the undulations of the fiber (2) defining a set of regularly spaced optical coupling regions. This provides a readily formed coupler able to be accurately set to selectively couple a pre-selected wavelength by relatively coarse macroscopic adjustment.**

22 Claims, 3 Drawing Sheets