Patent Abstracts

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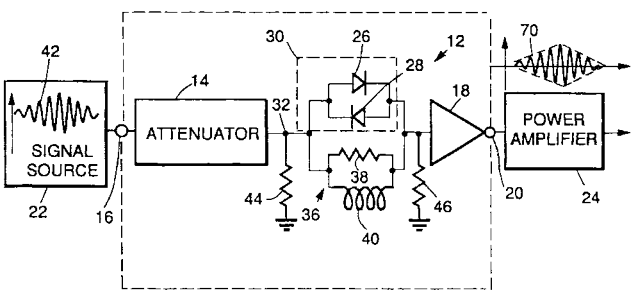
5,523,716 June 4, 1996

Microwave Predistortion Linearizer

Inventors: John R. Grebliunas, Arnold L. Berman, and David L. Crampton.
Assignee: Hughes Aircraft Company.
Filed: Oct. 13, 1994.

***Abstract*—**A predistortion linearizer (**10**) and method for distorting an ac input signal (**42**) to a power amplifier (**24**) provide a distortion to the input signal which is complementary to a distortion in terms of gain and phase, introduced by the power amplifier as a function of signal amplitude, thereby to linearize the power amplifier. The linearizer includes a switching circuit (**26**, Z_1, **28**, Z_2) having an input terminal (**16**) and an output terminal (**20**) and a pair of antiparallel diodes (**26**, **28**) connected between the input terminal and the output terminal of the switching circuit. The linearizer has also an impedance circuit (Z_3) comprising solely passive electrical elements connected between the input terminal and the output terminal of the switching circuit, wherein elements of the impedance circuit have values selected to introduce the complementary distortion to the input signal as a function of amplitude of the input signal to linearize the power amplifier.

14 Claims, 2 Drawing Sheets



PREDISTORTION LINEARIZER,10

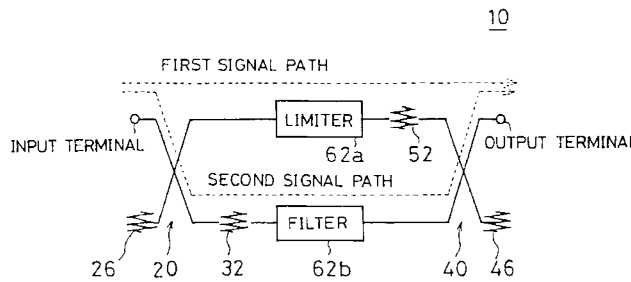
5,523,725 June 4, 1996

Signal-to-Noise Enhancer

Inventors: Youhei Ishikawa, Takekazu Okada, Satoru Shinmura, Fumio Kanaya, Shinichiro Ichiguchi, Toshihito Umegaki, and Toshihiro Nomoto.
Assignees: Murata Manufacturing Co., Ltd., Nippon Hoso Kyokai.
Filed: Feb. 28, 1995.

Abstract*—**A signal-to-noise enhancer **10** includes a first 90-degree hybrid set **20**. A first output end of the first 90-degree hybrid set **20** is connected to an input end of a limiter used a magnetostatic wave element ***62a utilized the magnetostatic surface wave mode. Also, a second output end of the first 90-degree hybrid set **20** is connected to an input end of a filter used a magnetostatic wave element ***62b*** similar to the magnetostatic wave element ***62a*** in structure, via a resistor **32** as a first attenuator. Furthermore, an output end of the limiter is connected to a first input end of a second 90-degree hybrid set **40** via a resistor **52** as a second attenuator. Also, an output end of the filter is connected to a second input end of the second 90-degree hybrid set **40**.

9 Claims, 7 drawing Sheets



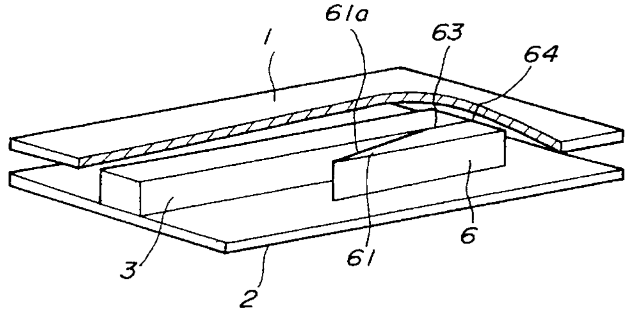
5,523,727 June 4, 1996

Dielectric Waveguide Including a Tapered Wave Absorber

Inventor: Masahito Shingyoji.
Assignee: Honda Giken Kogyo Kabushiki Kaisha.
Filed: Nov. 22, 1994.

***Abstract*—**A dielectric waveguide has a pair of parallel flat metallic plates spaced from each other, a dielectric strip sandwiched between the parallel flat metallic plates, and a wave absorber sandwiched between the parallel flat metallic plates and extending parallel to the dielectric strip. The wave absorber has a tapered portion which is progressively closer to the dielectric strip in a direction away from an inlet end of the wave absorber. The wave absorber has a side surface which may be held in contact with a side surface of the dielectric strip to provide a termination for eliminating reflections of input electromagnetic waves applied to the nonradiative dielectric waveguide, or may be spaced from a side surface of the dielectric strip to provide an attenuator for attenuating the power of input electromagnetic waves applied to the nonradiative dielectric waveguide.

8 Claims, 2 Drawing Sheets



Publisher Item Identifier S 1051-8207(97)05397-X.

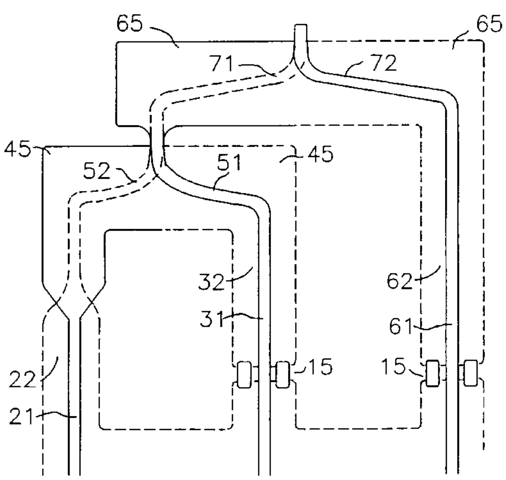
5,523,728 June 4, 1996

Microstrip DC-to-GHz Field Stacking Balun

Inventor: John W. McCorkle.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: Aug. 17, 1994.

***Abstract*—**A wide-band (dc to GHz) PC-board Balun is disclosed. The balun maintains low insertion loss and good balance for ultra-wide-band (UWB) applications such as impulse radar. The balun structure is formed by microstrip transmission lines on a dielectric substrate, having at least one inverting and one noninverting transmission lines. The transmission lines are connected to form balanced transmission lines stacked about a ground plane. N transmission lines can be connected to form a N^2:1 impedance ratio balun. Ferrite cores placed about the transmission lines and resistor–capacitor circuits improve the low-frequency operation of the balun.

17 Claims, 10 Drawing Sheets



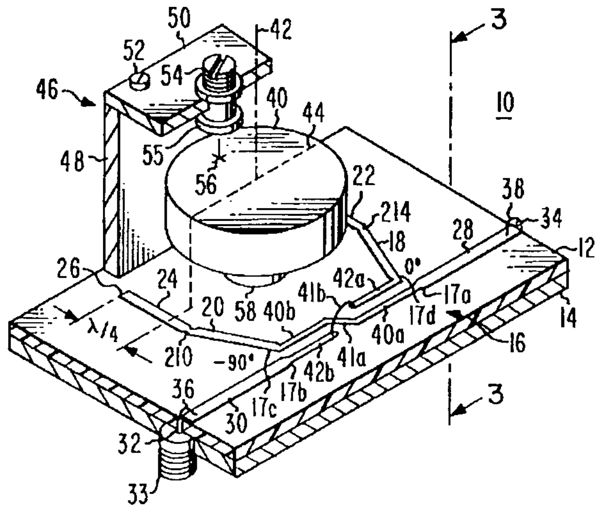
5,525,945 June 11, 1996

Dielectric Resonator Notch Filter with a Quadrature Directional Coupler

Inventors: Mark C. Chiappetta and John S. Daukas.
Assignee: Martin Marietta Corp.
Filed: Jan. 27, 1994.

***Abstract*—**A notch filter includes a directional coupler (**16**) with an input port (**17**a), coupled output port (**17**b), coupled 0° (**17**d) and direct 90° (**17**c) ports. A cylindrical dielectric resonator (**40**) is supported by a spacer (**58**) above a ground plane (**14**) and dielectric substrate (**12**). A first microstrip transmission line includes a strip conductor (**22**) coupled at one end to the coupled 0° port and extending parallel to a tangent to the edge of the resonator at a central plane (**44**), terminating in an open-circuit (**226**). A second transmission line includes a strip conductor (**24**) coupled to the direct 90° port (**17**c) and extending parallel to the first transmission line, on the other side of the resonator. The first and second transmission lines each have an electrical length $\lambda/4$ between the central plane (**44**) and their open-circuit terminations, to reflect a high current to the plane. The high current represents maximum transmission line current, for maximizing coupling to the resonator. An offset metal plunger generates a higher order mode, which is combined with the fundamental to improve rejection at the notch.

9 Claims, 6 Drawing Sheets



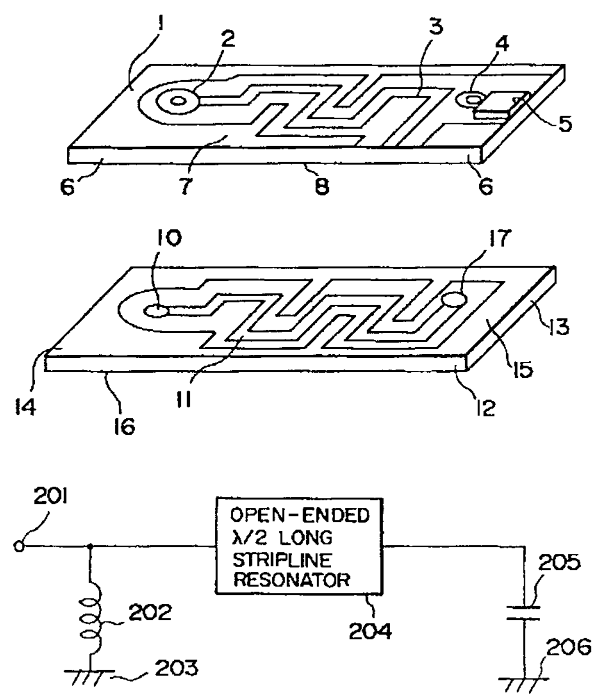
5,525,954 June 11, 1996

Stripline Resonator

Inventor: Tomokazu Komazaki, Katsuhiko Gunji, Toshikazu Yasuoka, Kohichiro Shimizu, Hiroyuki Horii, Yoshio Okada, Masao Iwata, and Kazushige Nogichi.
Assignee: Oki Electric Industry Co., Ltd.
Filed: July 22, 1994.

***Abstract*—**A stripline resonator is constructed of a dielectric plate having a ground electrode formed on a side surface thereof, an open-ended $\lambda/2$-long stripline arranged on a top surface of the dielectric plate, an input terminal to which signals are inputted, said input terminal is connected to one end of the open-ended $\lambda/2$ long stripline, a first reactance element connected either in series or in parallel between the input terminal and the open-ended $\lambda/2$ long stripline, and a second reactance element connected at one end thereof to an opposite end of the open-ended $\lambda/2$ long stripline and at an opposite end to a ground electrode.

10 Claims, 10 Drawing Sheets



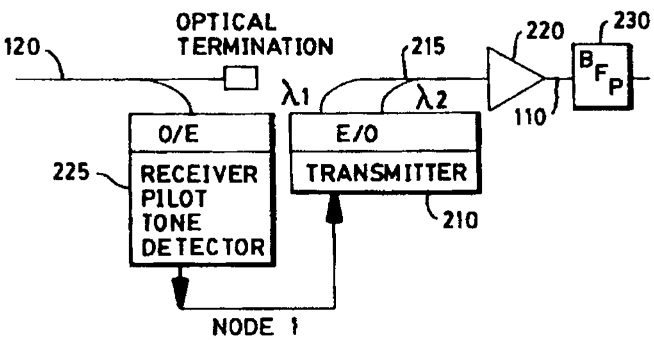
5,526,152 June 11, 1996

Repeater-Less Multigigabit Lightwave Buses with Optical Amplifiers

Inventor: Kwang-Tsai Koai.
Assignee: GTE Laboratories Incorporated.
Filed: Sept. 24, 1993.

***Abstract*—**Apparatus is disclosed which is advantageously used in local area, metropolitan-area, and wide-area optical networks having a dual bus architecture, permitting significantly increased distance before termination of regeneration of the optical signal. A portion of the received optical signal is tapped from a fiber and converted to an electrical signal before presentation to a node. That remaining portion of the received optical signal enters a fiber delay line and is amplified by an optical amplifier. Data to be transmitted from a node is converted from an electrical signal to an optical signal and transmitted on the bus.

5 Claims, 5 Drawing Sheets



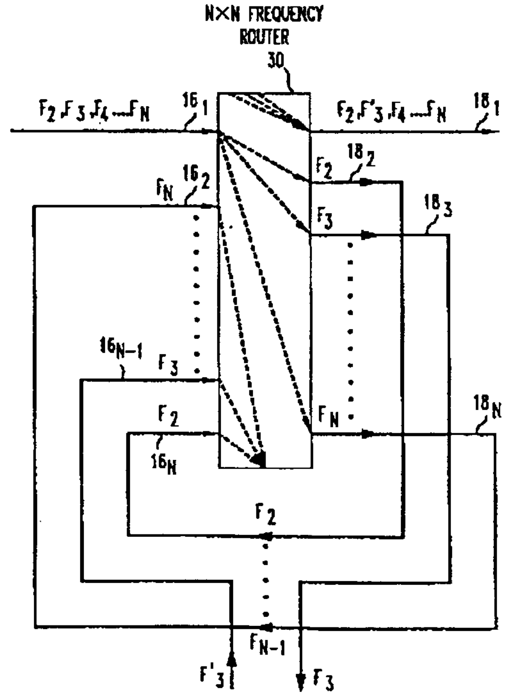
5,526,153 June 11, 1996

Optical Channel Adding/Dropping Filter

Inventor: Bernard Glance.
Assignee: AT&T Corp.
Filed: Jan. 21, 1994.

***Abstract*—**An optical filter is formed from an optical frequency routing device having N inputs and N outputs, where $N > 1$. A plurality of waveguides each couple one of the outputs to one of the inputs of the frequency routing device in a consecutive order to form a series of optically transmissive feedback loops. As a result of this arrangement, an input signal composed of a plurality of multiplexed optical frequencies directed to an input of the routing device is first demultiplexed to yield a sequence of demultiplexed frequency components which are directed to the outputs of the routing device. The demultiplexed frequencies may be rerouted back to the inputs of the routing device via the optical feedback loops between the outputs and the inputs. A remaining output that is not incorporated into one of the feedback loops is provided for receiving the resulting multiplexed output signal. Rather than rerouting the demultiplexed frequency components back through the routing device via optical loops, one or more of the loops may be opened up to either drop, add, or drop and add a frequency component.

14 Claims, 4 Drawing Sheets



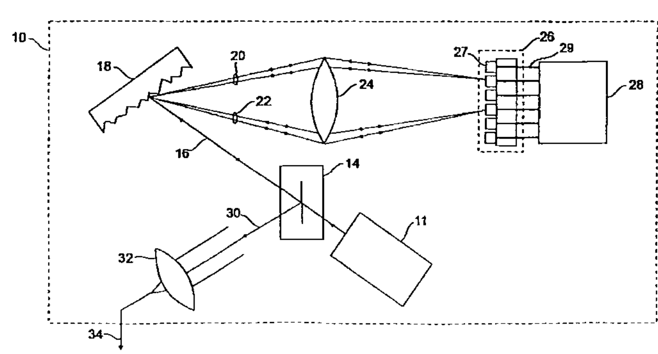
5,526,155 June 11, 1996

High-Density Optical Wavelength Division Multiplexing

Inventors: Wayne H. Knox, David A. B. Miller, and Martin C. Nuss.
Assignee: AT&T Corp.
Filed: Nov. 12, 1993.

***Abstract*—**The present invention provides an apparatus and method for high-density optical wavelength division multiplexing (WDM) using a single optical source. An optical wavelength division multiplexer in accordance with the present invention includes an optical source providing an optical pulse signal. A wavelength splitter separates the optical pulse signal spectrum into a plurality of channel signals at different wavelengths such that each channel signal may be separately modulated or otherwise processed. A wavelength combiner then recombines the separately modulated channel signals to provide a high-density WDM optical signal particularly well-suited for use in optical circuit interconnection and optical communication network applications. The high-density single-source multiplexer of the present invention may also be conveniently adjusted to align channel signal wavelengths or to compensate for optical fiber dispersion.

24 Claims, 5 Drawing Sheets



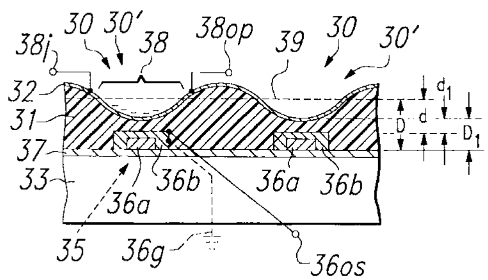
5,526,172 June 11, 1996

Microminiature, Monolithic, Variable Electrical Signal Processor and Apparatus Including Same

Inventor: Brad Kanack.
Assignee: Texas Instruments Incorporated.
Filed: July 27, 1993.

Abstract—A microminiature, variable electrical device, such as a capacitor (**40*a***), comprises an elemental DMD SLM (**40′**), which includes a substrate (**43**) and a member (**145**) spaced therefrom and mounted for movement by appropriate facilities (**42**, **44**). A control signal (**102**) is applied to the movable member (**145**) to produce an electric field between it and either the substrate (**43**) or an associated control electrode (**46*a***). The field moves the member (**145**) toward or away from either the substrate (**43**) or an associated output electrode (**46*b***) to selectively adjust the spacing therebetween. The field is produced by addressing circuitry (**45**) associated with the substrate (**43**). The movable member (**145**) and either the substrate (**43**) or the output electrode (**46*b***) function as capacitor plates, and the spacing determines the capacitance thereof. The capacitor (**40*a***) may be placed in series (Fig. **4**) or in parallel (Fig. **3**) with an input signal (**114**) applied to the movable member (**145**). The movable member (**145**), substrate (**43**), control electrode (**46*a***), output electrode (**46*b***), addressing circuitry (**45**), and other elements of the capacitor (**40*a***) comprise a monolithic structure resulting from the use of MOS, CMOS or similar fabrication techniques. Multiple capacitors may be included in transmission lines (Fig. **20**), antennae (Fig. **22**), couplers (Fig. **21**), waveguides (Fig. **25**) and other apparatus for digital or analog tuning of capacitance adjustment thereof by selective operation of the addressing circuitry (**45**).

130 Claims, 12 Drawing Sheets



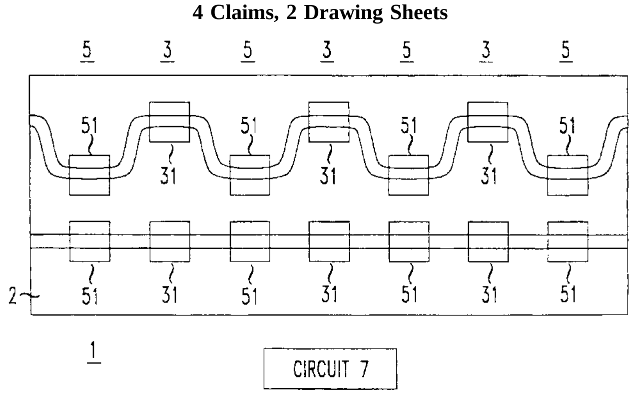
5,526,439 June 11, 1996

Optical Filter Using Electrooptic Material

Inventor: Ernest E. Bergmann.
Assignee: AT&T Corp.
Filed: Dec. 30, 1994.

Abstract—An optical filter is fabricated in an electrooptic material such as lithium niobate and uses a plurality of pairs of waveguides coupled to each other by optical coupling regions. The waveguides and optical coupling regions overlying electrodes which are used to tune the filter by varying the optical path length difference between waveguides and the optical cross coupling in the optical coupling regions.

4 Claims, 2 Drawing Sheets



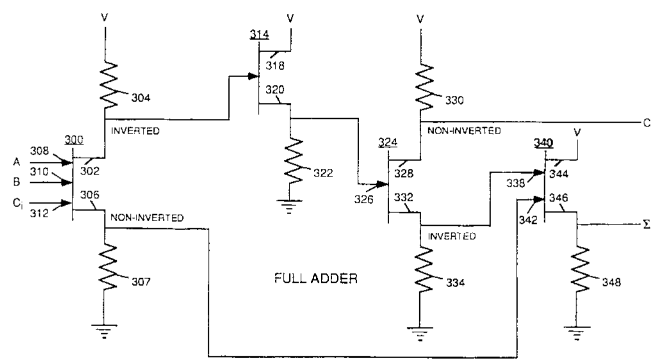
5,528,174 June 18, 1996

Devices for Implementing Microwave Phase Logic

Inventor: Fred Sterzer.
Filed: Mar. 14, 1994.

Abstract—Any one of several improved devices capable of implementing microwave phase logic (MPL) operating at gigabits per second rates comprises either at least one of means performing the function of a multigate microwave-monolithic-integrated-circuit (MMIC) field-effect transistor (FET), or a pair of doubly balanced mixers, in which each of the mixers includes an RF port, a local-oscillator (LO) port and an IF port, and the IF port of a first of the doubly balanced mixers is directly connected to the IF port of a second of the doubly-balanced mixers. The first of the doubly balanced mixers is operative as a demodulator for deriving (1) a given polarity at its IF port in response to substantially in-phase signals of the same first specified frequency being respectively applied to its RF and LO ports and (2) a polarity opposite to the given polarity at its IF port in response to substantially out-of-phase signals of the same first specified frequency being respectively applied to its RF and LO ports, and the second of the doubly balanced mixers is operative as a modulator for deriving (3) a signal of a given phase and second specified frequency at its RF port in response to a signal of the second specified frequency being applied to its LO port and the given polarity being applied its IF port and (4) a signal of a phase substantially 180° out-of-phase with the given phase and second specified frequency at its RF port in response to a signal of the second specified frequency applied to its LO port and the polarity opposite to the given polarity being applied its IF port.

10 Claims, 5 Drawing Sheets



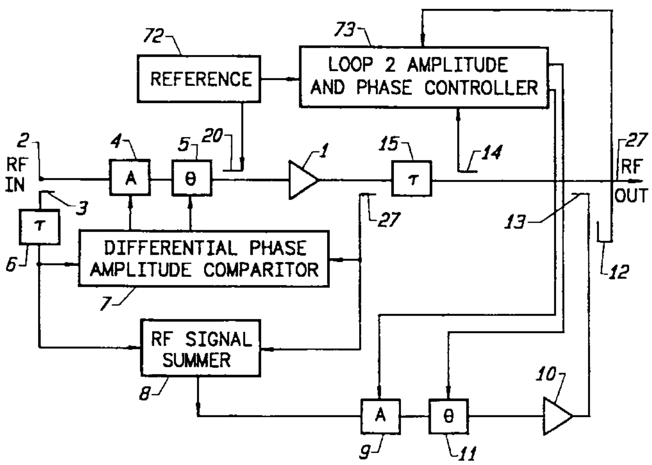
5,528,196 June 18, 1996

Linear RF Amplifier Having Reduced Intermodulation Distortion

Inventors: Brian L. Baskin, Lance T. Mucenieks, and Huong M. Hang.
Assignee: Spectrian, Inc.
Filed: Jan. 6, 1995.

Abstract—A first loop is provided to subtract a properly scaled and delayed sample of the amplifier's input spectrum from a scaled and phase-shifted sample of its output spectrum which contains intermodulation distortion. The result of this subtraction (if the samples are maintained at the same amplitude and 180 degrees out of phase) is a signal rich in the intermodulation products of the amplifier. A feature of the invention is a differential phase-amplifier comparator which compares the signals prior to and after amplification and generates control signals for amplitude and phase trimmers for the signal prior to the amplifier and thus maintains the required equal amplitude and 180-degree phase relationship required for carrier cancellation. The signals before amplification and after amplification are subtracted leaving substantially the intermodulation products resulting from amplification. A second loop is provided to reduce intermodulation distortion when a plurality of signals are amplified, resulting in the intermodulation of the signals. The intermodulation products are then fed forward with suitable amplification by an error amplifier and phase shift to cancel the amplifier intermodulation products when added to the amplifier output.

13 Claims, 5 Drawing Sheets



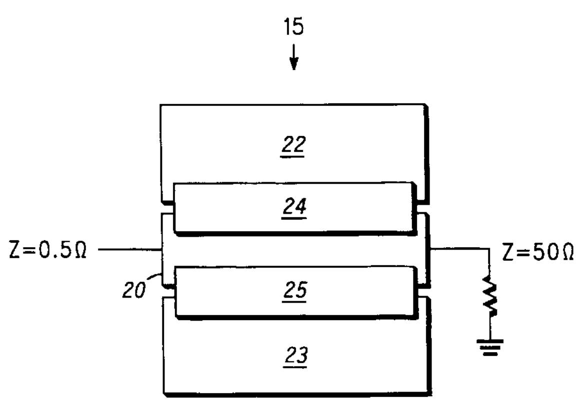
5,528,202 June 18, 1996

Distributed Capacitance Transmission Line

Inventors: Daniel D. Moline and Robert P. Davidson.
Assignee: Motorola, Inc.
Filed: Dec. 23, 1994.

Abstract—A technique for achieving impedance transformations utilizing transmission lines has been provided. This technique involves placing additional distributed capacitance along the length of a transmission line thereby reducing the effective characteristic impedance of the transmission line. The effective wavelength for the transmission line is also reduced thereby substantially reducing the electrical length of a quarter wavelength matching network and making the transmission line practical and effective even at low frequencies.

8 Claims, 1 Drawing Sheet



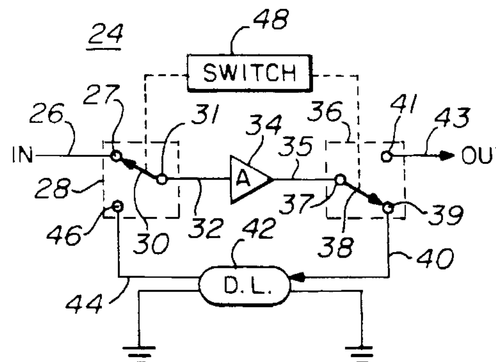
5,530,402 June 25, 1996

Single Sequential Amplifier Circuit

Inventor: Peter V. Wright.
Assignee: RF Monolithics, Inc.
Filed: Jan. 27, 1995.

Abstract—An RF signal amplifier comprising a single stage of amplification coupled through a first switch to the input of a SAW delay line and, after the SAW delay line is charged, through a second switch to the input RF amplifier for second amplification with the output of the RF amplifier being coupled through said first switch to an output terminal.

10 Claims, 2 Drawing Sheets



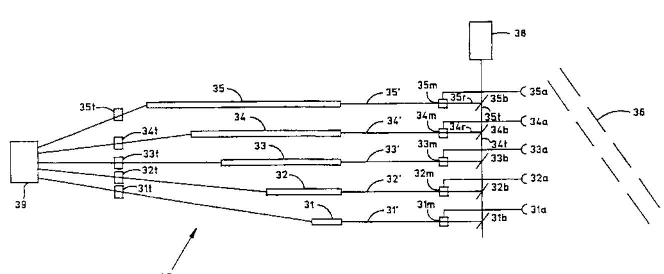
5,530,778 June 25, 1996

Direction Finding Apparatus Using Tunable Fiber Optic Delay Line

Inventor: Howard E. Rast.
Assignee: The United States of America as represented by the Secretary of The Navy.
Filed: Feb. 23, 1995.

Abstract—A direction-finding apparatus and method for an RF signal are described which provide a variable time delay in fiber-optic cables. A tunable transmitter launches optical emissions of several wavelengths into a plurality of fiber-optic cables. Since the wavelength material of each cable exhibits anomalous dispersion of the optical emissions, large changes in group refractive index are provided as a function of the different wavelengths of the optical emissions. As a consequence, only small changes in the different wavelengths of the optical emissions produce large changes in the time delay of the different wavelengths of the optical emissions within a fixed length of the optical fiber cables. This apparatus and method produce sensitive angle of arrival determinations for RF signals.

14 Claims, 2 Drawing Sheets



5,530,928 June 25, 1996

Balanced Dual Mode Mixer Apparatus

Inventors: Charles E. Wheatley, III, Tohru Izumiyama, Tsuyoshi Kitamura, and Mitzunari Okazaki.
Assignee: QUALCOMM Incorporated.
Filed: May 22, 1995.

Abstract—A balanced mixer is used as a switch. In digital mode, the balanced mixer receives a digital mode analog waveform and a local oscillator (L.O.). The balanced mixer mixes the waveform and the L.O. to provide a resultant output signal. In analog mode, the L.O. is modulated to contain the communication information. No analog signal is present on the port of the mixer which received the digital mode analog waveform in digital mode. The desired output of the mixer is the modulated L.O. In order to pass the L.O. through the mixer, a dc bias is applied to one of the waveform terminals of the mixer to unbalance it. A diode attenuator is added to the output of the mixer to provide scaling of the analog mode output.

5 Claims, 2 Drawing Sheets