Patent Abstracts

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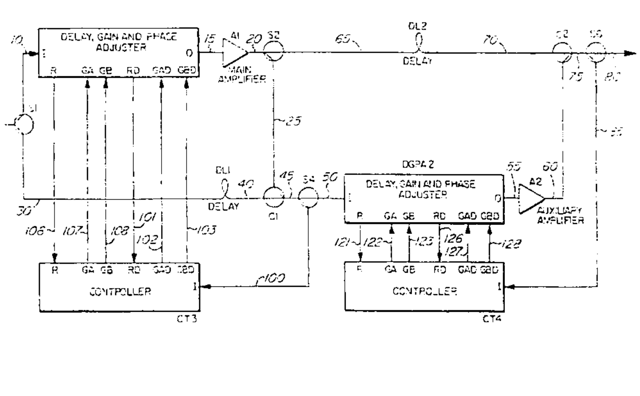
5,489,875 Feb. 6, 1996

Adaptive Feedforward Linearizer for RF Power Amplifiers

Inventor: James K. Cavers.
Assignee: Simon Fraser University.
Filed: Sept. 21, 1994.

***Abstract*—**A feedforward amplifier circuit for amplifying an input signal to produce an amplified replica thereof. A first splitter splits the input signal into first and second signal cancellation branches. The first signal cancellation branch contains an amplifier and a first "delay, gain, and phase adjuster" (DGPA), connected in series between a first output of the first splitter and the amplifier, and a second splitter connected in series with the amplifier's output for splitting the amplified output signal into first and second distortion cancellation branches. The second signal cancellation branch contains a first delay line connected in series between a second output of the first splitter and a first input of a first combiner. The second splitter has a first output coupled to a second input of the first combiner. The first distortion cancellation branch contains a second delay line connected in series between a second output of the second splitter and a first input of a second combiner. The second distortion cancellation branch contains a third splitter, connected in series between the first combiner and a second DGPA, and an auxiliary amplifier connected in series between the second DGPA and a second input of the second combiner. A first controller is connected between an output of the third splitter and the first DGPA to adapt the first DGPA to changes in signals at the third splitter's output and to changes in signals output by the first DGPA. A second controller is connected between an output of a fourth splitter and the second DGPA to adapt the second DGPA to changes in signals at the fourth splitter's output and to changes in signals output by the second DGPA. The fourth splitter is connected to receive the output of the second combiner and provides the amplified replica at its output.

15 Claims, 17 Drawing Sheets



Publisher Item Identifier S 1051-8207(97)02214-9.

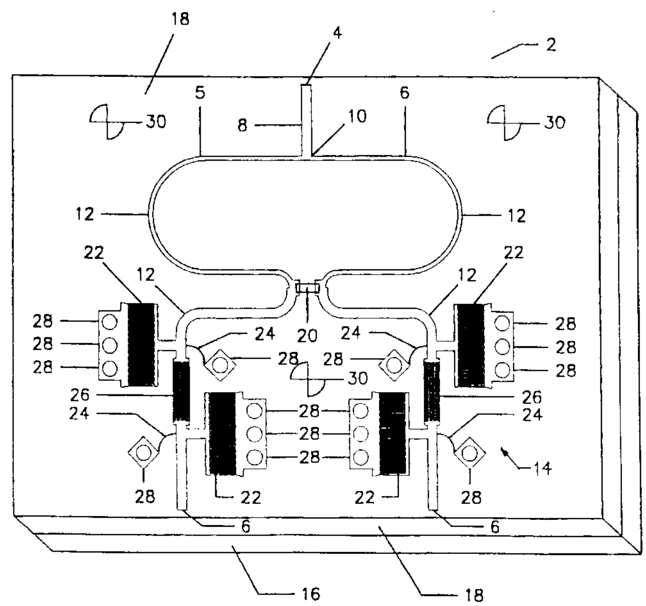
5,489,880 Feb. 6, 1996

Power Divider/Combiner with Lumped-Element Bandpass Filters

Inventor: Arvind Swarup.
Assignee: Com Dev Ltd.
Filed: May 5, 1994.

***Abstract*—**A power divider has a microstripline circuit with bandpass filters at each output that are lumped-element printed bandpass filters. The filters widen the isolation bandwidth of the divider. Power dividers can be reversed for use as power combiners.

9 Claims, 5 Drawing Sheets



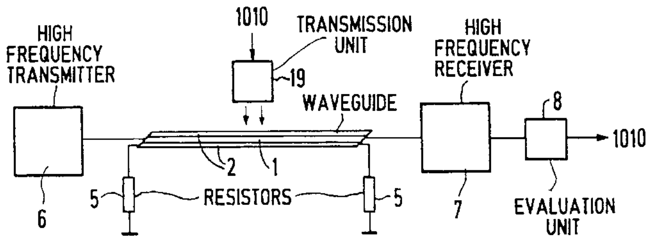
5,490,008 Feb. 6, 1996

Noncontacting Optical Data Transmission System

Inventors: Reinhold Guempelein and Peter Gawlik.
Assignee: Siemens Aktiengesellschaft.
Filed: May 10, 1994.

***Abstract*—**A noncontacting optical data transmission system, suitable for transmitting data between relatively movable mechanical parts, includes a waveguide, having a high-frequency generator connected as one end and a high-frequency receiver connected at an opposite end, the basic dielectric material of the waveguide being entirely or partially replaced by photosensitive material. An illumination pattern is generated on the waveguide with a light source and a mask, the reflection behavior of the waveguide being modified by this illumination pattern, thereby causing the amplitude of the signal transmitted through the waveguide to be modulated by keying the light source according to the data to be transmitted.

4 Claims, 3 Drawing Sheets



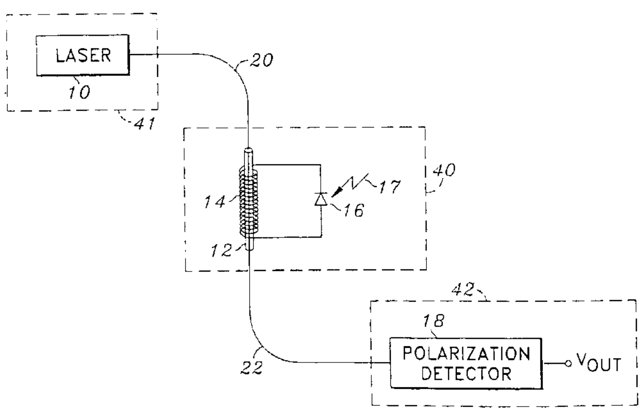
5,491,334 Feb. 13, 1996

Magnetooptical Input System for Infrared Detectors

Inventors: Alvin Gartenberg and David I. Durst.
Assignee: Grumman Aerospace Corporation.
Filed: Aug. 22, 1994.

Abstract**—**A detector interface system communicates signals between an infrared detector element maintained in a cryogenic environment and associated signal processing circuitry maintained in a noncryogenic environment. An optical modulator disposed within the cryogenic environment in electrical communication with the infrared detector element converts the electrical output of the infrared detector element into an optical output signal representative thereof. An optical demodulator disposed in the noncryogenic environment converts the optical output signal of the optical modulator into an electrical signal. The optical demodulator is an electrical communication with the signal processing circuitry. An optical path from the optical modulator to the optical demodulator provides thermal isolation between the infrared detector element and its associated signal processing circuitry and minimizes detector bias so as to mitigate $1/f$ noise.

20 Claims, 1 Drawing Sheet



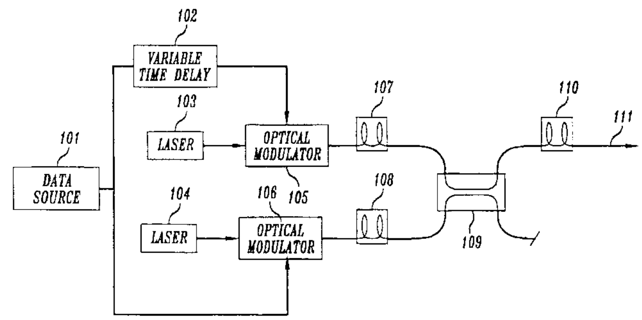
5,491,576 Feb. 13, 1996

Dual-Wavelength Data Transmitter for Reducing Fading in an Optical Transmission System

Inventor: Neal S. Bergano.
Assignee: AT&T Corp.
Filed: Dec. 23, 1993.

Abstract**—**The problems relating to SNR fading over long optical transmission paths are overcome by dynamically controlling an optical signal source having two signal components each with a different wavelength, where the parameters to be controlled include the wavelengths of the two signal components, the relative and absolute SOP's of the two signal components, and the relative delays between the data patterns carried by the signal components so that the polarization of the two signal components of the optical signal are continuously reoptimized in the presence of PDL, PMD, PDHB, and fiber nonlinearities.

39 Claims, 4 Drawing Sheets



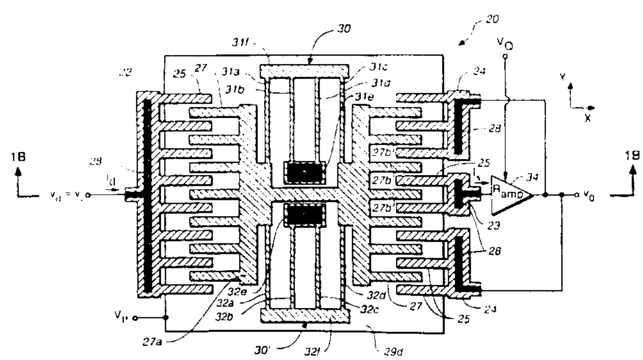
5,491,604 Feb. 13, 1996

Q-Controlled Microresonators and Tunable Electronic Filters Using Such Resonators

Inventors: Clark T.-C. Nguyen and Roger T. Howe.
Assignee: The Regents of the University of California.
Filed: Dec. 11, 1992.

Abstract**—**Resonator systems with controlled quality factors, including a resonator having a plurality of ports and a first quality factor greater than the system quality factor, and an amplifier providing negative feedback among the ports to render the system quality factor independent of the resonator quality factor.

19 Claims, 21 Drawing Sheets



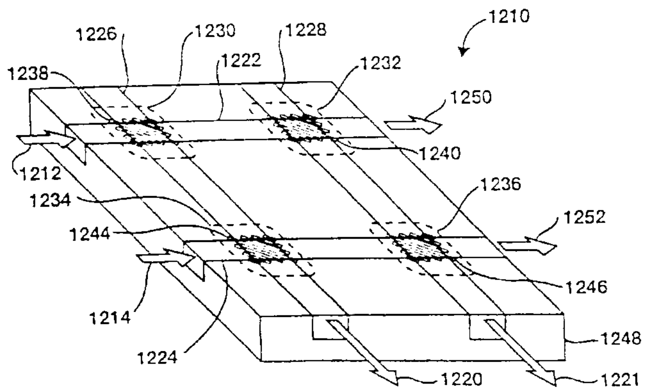
5,491,762 Feb. 13, 1996

ATM Switch with Electrically Controlled Waveguide-Routing

Inventors: David A. G. Deacon, William K. Bischel, Michael J. Brinkman, and Simon J. Field.
Assignee: Deacon Research.
Filed: Sept. 9, 1994.

Abstract**—**Optical energy transfer devices and energy guiding devices arranged in an array use an electric field to control energy propagation. The energy transfer devices and guiding devices use a class of poled structures in solid material that realize a high-speed matrix switch, which is known as an asynchronous transfer mode (ATM) switch used for routing communication signals. The poled structures, which may form groups or total internal reflection devices, are combined with waveguide structures. Electric fields applied to the poled structures control routing of optical energy.

14 Claims, 30 Drawing Sheets



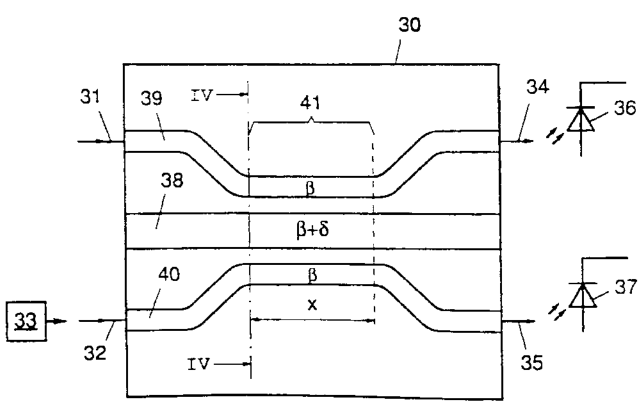
5,491,763 Feb. 13, 1996

Optical Hybrid with 3×3 Coupling Device

Inventors: Mattijs O. van Deventer and Johannes J. G. M. van Der Tol.
Assignee: Koninklijke PTT Nederland N.V.
Filed: May 13, 1993.

Abstract—In known coherent optical receivers comprising two detectors, optical 90° hybrids have a "throughput"≦25%. Theoretical analysis reveals that a higher "throughput" of up to a maximum of approximately 29.3% is possible. The invention provides such a 90° hybrid (**30**) of the coupler type with the aid of a 2 × 2 port, which is based on a loss-free 3 × 3 directional coupler having the maximum throughput ratios between two of the inputs (**31**/**39**, **32**/**40**) and two of the outputs (**39**/**34**, **40**/**35**) and the 90° phase difference between said two outputs, the third input and the third output not being used. An integrated version employing indium phosphide is described.

13 Claims, 2 Drawing Sheets



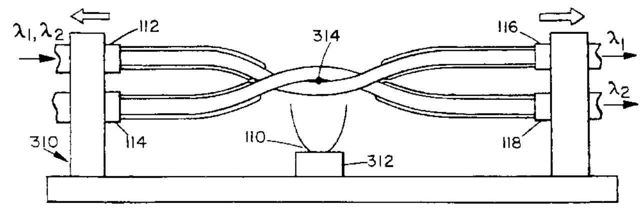
5,491,764 Feb. 13, 1996

Narrowband Twisted Optical Fiber Wavelength Division Multiplexer

Inventors: Andong Hu and Douglas P. Bonnell.
Assignee: Tacan Corporation.
Filed: May 31, 1994.

Abstract—A narrowband twisted optical fiber wavelength division multiplexer (WDM) and a method for fabricating the WDM. The WDM includes a twisted pair of first and second optical fibers that are fused together, each of the first and second fibers having a first and second end. In the WDM when a first and second light are applied to the first end of the first fiber, they will appear on the second end of the first fiber and the second end of the second fiber, respectively. When the first light enters the second end of the first fiber and the second light is applied to the second end of the second fiber, they will both appear on the first end of the first fiber.

24 Claims, 3 Drawing Sheets



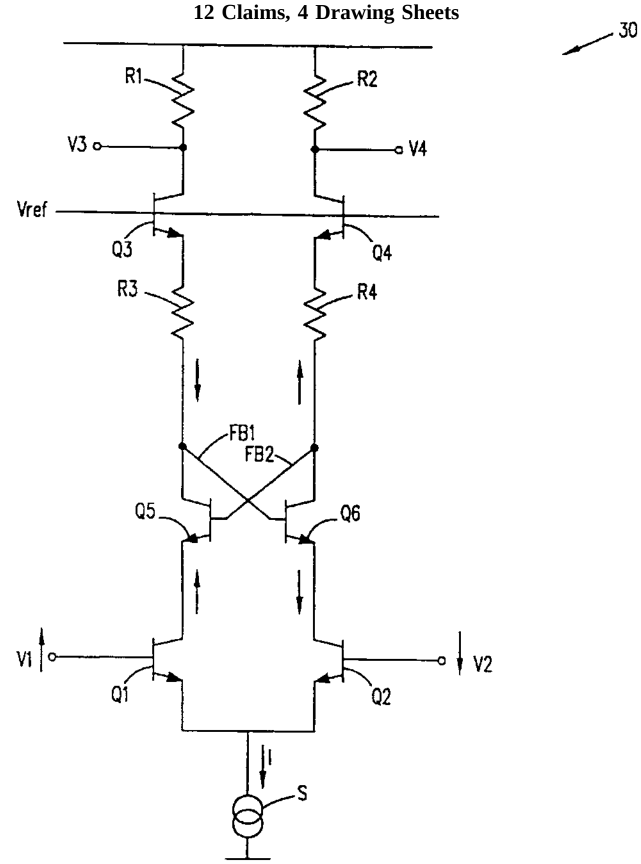
5,493,254 Feb. 20, 1996

Amplifier Including Circuit for Reducing Input Capacitance

Inventor: Alexander Fairgrieve.
Assignee: National Semiconductor Corporation.
Filed: Mar. 31, 1994.

Abstract—The input capacitance of a differential amplifier is reduced by connecting a positive feedback path between the collector of each input transistor and a terminal of a resistor connected in the other parallel current path. The positive feedback paths cause the voltage at the collector of each input transistor to move in the same direction as the voltage at the base of that input transistor and thereby reduce the effective input capacitance seen at the input terminals of the differential amplifier.

12 Claims, 4 Drawing Sheets



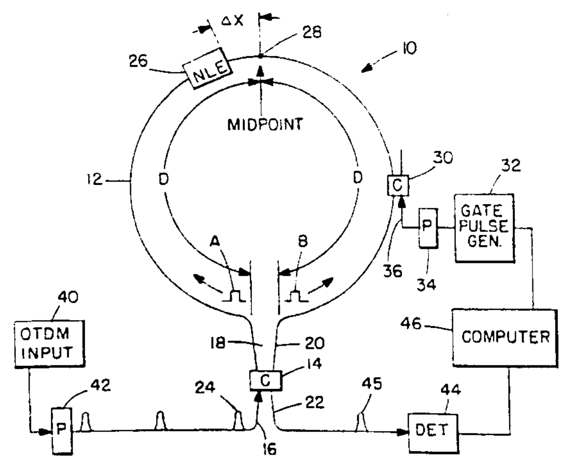
5,493,433 Feb. 20, 1996

Terahertz Optical Asymmetric Demultiplexer

Inventors: Paul R. Prucnal and Jason P. Sokoloff.
Assignee: Trustees of Princeton University.
Filed: Mar. 2, 1994.

Abstract**—**An optical demultiplexer includes an optical loop having first and second terminals and a midpoint. A nonlinear optical element is positioned in the loop at a distance Δx from the midpoint. A first coupler is positioned in the loop and has a gating pulse applied that causes a change in the optical property of the nonlinear optical element from a first state to a second state. A second coupler is optically coupled to the first and second terminals and has an input terminal for receiving a series of input optical pulses. The second coupler responds by inducing, for each input pulse, a pair of counter-propagating pulses in the optical loop. Control circuitry causes a gating pulse to be applied to the optical loop and to be timed to switch the nonlinear optical element to from a first to a second state after one of the pair of counter-propagating pulses has passed through the nonlinear optical element, but before the other counter-propagating pulse has reached the nonlinear optical element. In this manner, one counterpropagating pulse is affected by the second state of the nonlinear optical element and the other counterpropagating pulse is not, thereby enabling a differential signal to exit from the output of the second coupler to a detector.

9 Claims, 3 Drawing Sheets



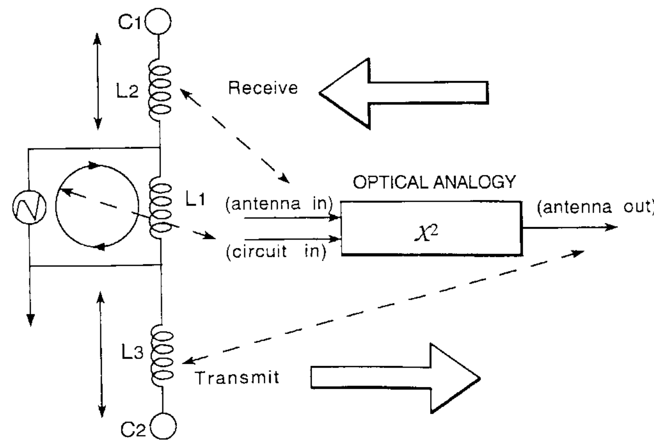
5,493,691 Feb. 20, 1996

Oscillator-Shuttle-Circuit (OSC) Networks for Conditioning Energy in Higher-Order Symmetry Algebraic Topological Forms and RF Phase Conjugation

Inventor: Terence W. Barrett.
Filed: Dec. 23, 1993.

Abstract**—**The present invention provides passive networks that act as the host to nonlinear and parametric interactions, with energy inputs to said networks being caused to "bleed off" auxiliary, and time-delayed conditioning flows resulting in phase modulations to the main input and that achieve, e.g., RF phase conjugation with cancellation of the noise modulation after two-way passage of beams between transmitter and receiver and when used in duplex arrangements. Also, passive networks for noise reduction in communications transmission due to conditioning of electromagnetic fields in higher-order group symmetry form. Because a transmitted wave from a network of the present invention is in higher-order group symmetry form and fields of such higher-order symmetry have a low probability of occurrence naturally, environmental noise, which is of lower group symmetry form (usually, $\mathrm{U}(1)$ symmetry) and has a high probably of natural occurrence, will be excluded from a receiver matched to higher-order symmetry waves. Therefore, in the case of communications, less noise will be processed statistically at a receiver designed for $\mathrm{SU}(2)$ or higher group symmetry operation, resulting in enhanced signal-to-noise. Also disclosed are passive networks for power transmission resulting in decreased loss in transmission. Higher-order group symmetry matched "receivers" will have enhanced signal-to-noise reception over lower-order symmetry receivers, i.e., leakage to ground will be less.

3 Claims, 4 Drawing Sheets



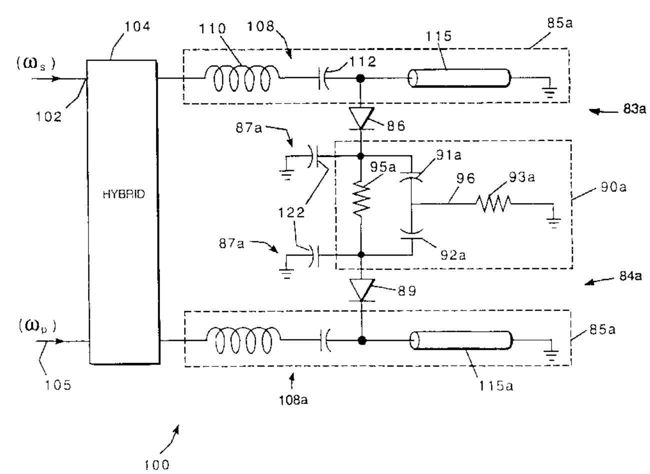
5,493,720 Feb. 20, 1996

High-Intercept Bandlimited Mixer

Inventor: Dean F. Peterson.
Assignee: Steinbrecher Corporation.
Filed: May 20, 1994.

Abstract**—**A mixer converting a frequency of an input signal to an intermediate frequency has an input port receiving an input signal oscillating at a signal frequency and a sinusoidal pump wave oscillating at a pump frequency. A diode is connected between an input network linked to the input port and an output port of the mixer. The output network and the input network together cause the diode to switch rapidly between ON and OFF states and behave as with square wave drive. Bias circuitry connected to the diode comprises a resistor connected to receive a dc component of current from the diode, the current through the resistor solely biasing the diode.

33 Claims, 8 Drawing Sheets



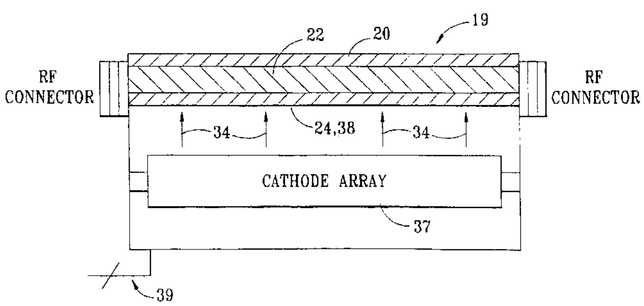
5,495,211 Feb. 27, 1996

Reconfiguration Microstrip Transmission Line Network

Inventor: Robert B. Liechty.
Assignee: E-Systems, Inc.
Filed: Jan. 3, 1995.

Abstract—The present invention discloses a reconfigurable microstrip transmission line network having a microstrip circuit consisting of an RF ground plan separated from a transmission layer by a dielectric layer. The transmission layer comprises a silicon material responsive to a plurality of excitation sources. The excitation sources generate excitation beams, which, upon interacting with the surface of the transmission layer, actuate a conductive pathway. By alternately actuating and deactuating the excitation sources and varying the excitation beams, the configuration of the microstrip transmission line network upon the transmission layer may be reconfigured as desired.

21 Claims, 2 Drawing Sheets



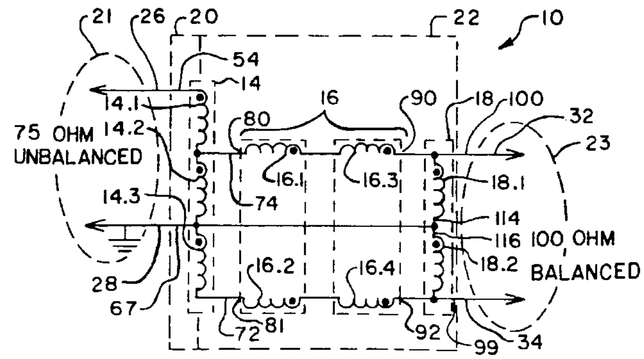
5,495,212 Feb. 27, 1996

Coupling Device Connecting an Unbalanced Signal Line to a Balanced Signal Line

Inventor: John E. DeCramer.
Assignee: BH Electronics, Inc.
Filed: Dec. 19, 1994.

Abstract—Disclosed is a passive, highly efficient, low-noise coupling device that includes a balun and noise reduction circuitry uniquely configured for converting an unbalanced video signal on a 75-Ω transmission line or connector to a balanced signal on a 100-Ω transmission line or connector and vice versa. The device efficiently allows use of a 100-Ω unshielded twisted pair, such as a conventional telephone cable, for multiplex transmission of video signals or the like in the frequency range of 50–500 MHz. The preferred embodiment has a circuit board with a 75-Ω unbalanced side and a 100-Ω balanced side separated by a balun having a toroid core with a very high permeability. A common mode choke for noise rejection is inserted in the balanced side. The choke has a dual toroid core—one core of high permeability and one of low permeability—and has windings with a 100-Ω characteristic impedance. A common mode toroid shunt on the device's balanced side provides further noise reduction. Circuit board traces connecting the components are impedance matched to either the balanced side or the unbalanced side as appropriate.

20 Claims, 2 Drawing Sheets



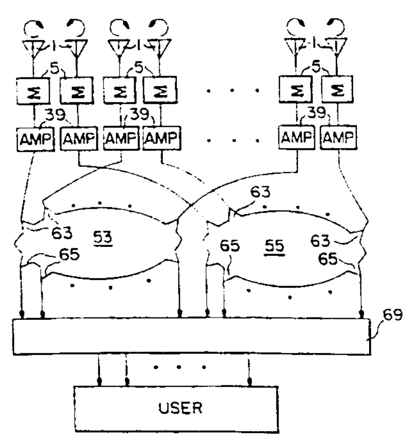
5,495,258 Feb. 27, 1996

Multiple Beam Antenna System for Simultaneously Receiving Multiple Satellite Signals

Inventors: Nicholas L. Muhlhauser, Scott A. Townley, and Thomas C. Weakley.
Assignee: Nicholas L. Muhlhauser.
Filed: Sept. 1, 1994.

Abstract—A multiple beam array antenna system including a first group of right-handed circularly polarized subarrays and a second group of left-handed circularly polarized subarrays. Combined signals from the right-handed subarrays are output via low-noise amplifiers to a first electromagnetic lens while the outputs of the left-handed circularly polarized subarrays are sent via low-noise amplifiers to a second steering electromagnetic lens. A satellite selection matrix output block allows a user to tap into signals from right-handed circularly polarized satellites, left-handed circularly polarized satellites, and linearly polarized satellites. A plurality of satellites (e.g., right-handed satellite "A" and linearly polarized satellite "B") may be accessed simultaneously, thus allowing the user to utilize both signals at the same time.

9 Claims, 11 Drawing Sheets



5,495,359 Feb. 27, 1996 **13 Claims, 3 Drawing Sheets**

Variable Sensitivity Compensation Network for Mach-Zender Optical Modulator

Inventors: Eitan Gertel and Mark S. Colyar.
Assignee: AEL Industries, Inc.
Filed: July 7, 1994.

Abstract—A variable sensitivity compensation network for a Mach-Zender optical modulator comprising first and second pilot signal sources f_1 and f_2, a signal coupler for combining the pilot signals with an RF information signal for modulating a bias-controlled Mach-Zender optical modulator, a variable sensitivity feedback loop comprising an optical detector for detecting the pilot signals from the modulator output, a bandpass filter for selecting the sum frequency f_1 and f_2, a voltage variable attenuator for adjusting the sensitivity of the loop, a logarithmic compression circuit for compressing the f_1 and f_2 signal level from the variable attenuator, means for measuring the signal level, and means for controlling the variable attenuator and for producing an analog bias signal for controlling the operating point of the Mach-Zender modulator. The measuring and controlling means include a microprocessor.