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.

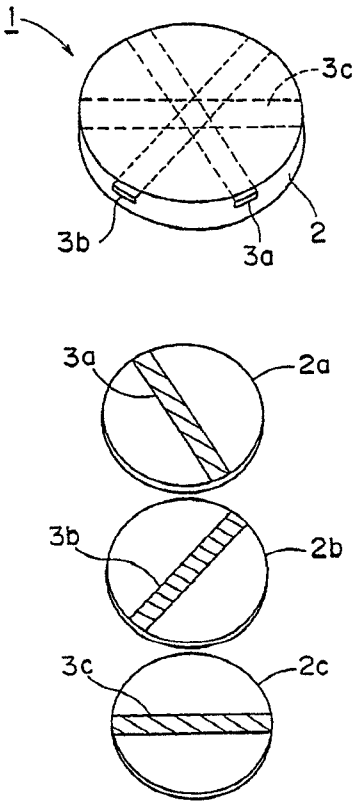
5,379,004 Jan. 3, 1995

High Frequency-Use Nonreciprocal Circuit Element

Inventors: Hiroshi Marusawa, Takashi Kawanami, Takehiro Kounoike, and Kunisaburo Tomono.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Aug. 2, 1993.

Abstract—A high-frequency-use nonreciprocal circuit element comprises a high-frequency-use magnetic layer and a plurality of center electrodes arranged therein to intersect with each other while being electrically insulated from each other. The plurality of center electrodes are advantageously embedded in the high-frequency-use magnetic layer or layers to be integrated with the same.

20 Claims, 7 Drawing Sheets



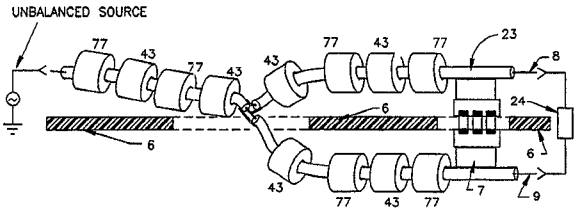
5,379,006 Jan. 3, 1995

Wideband (DC to GHz) Balun

Inventor: John W. McCorkle.
Assignee: The United States of America as represented by the Secretary of the Army.
Filed: June 11, 1993.

Abstract—An ultra-wideband dc to GHz balun consisting of transmission lines, a small inverting junction, and an RC network connecting the shields of the balanced load transmission lines such that an unbalanced source sees a matched load from dc to GHz.

8 Claims, 6 Drawing Sheets



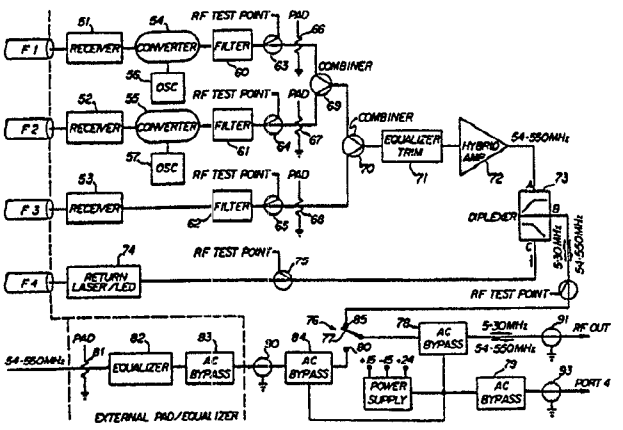
5,379,141 Jan. 3, 1995

Method and Apparatus for Transmitting Broadband Amplitude Modulated Radio Frequency Signals Over Optical Links

Inventors: Leo Thompson, Frank Little, and Rezin E. Pidgeon, Jr.
Assignee: Scientific-Atlanta, Inc.
Filed: Dec. 30, 1992.

Abstract—An optical communications system including a plurality of modulated radio frequency carriers that span more than an octave in bandwidth. In one implementation, the carriers are grouped into ranges that span less than an octave in bandwidth and the individual groups are transmitted over unique optical links. In another implementation, the groups are multiplexed on one optical link by using different wavelengths. In still another implementation, several of the bands are up-converted to the highest band of interest and then transmitted over either single or multiple links. The resulting optical signals are demodulated and then down-converted before they are recombined into the broadband signal in excess of an octave in bandwidth.

12 Claims, 12 Drawing Sheets



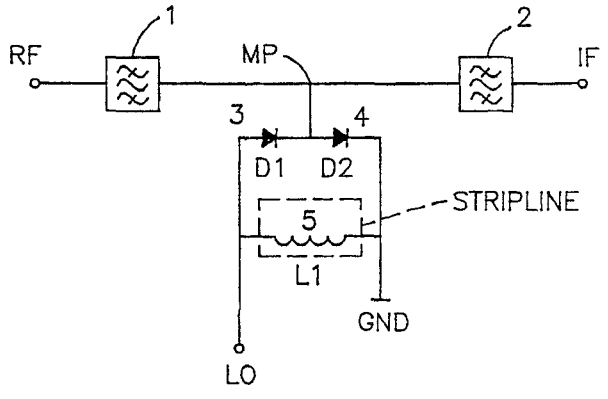
5,379,458 Jan. 3, 1995

Transformerless Diode Mixer

Inventor: Risto Väisänen.
Assignee: Nokia Mobile Phones Ltd.
Filed: Dec. 11, 1992.

Abstract—In the simplified diode mixer according to the invention, the transformer supplying the local oscillator signal is replaced by a circuit means that prevents build-up of a dc voltage at the terminals of the mixer diodes (**3**, **4**). The circuit means can be, e.g., a coil (**5**), a strip line or a diode pair. The filters (**1**, **2**) for the signals to be mixed are realized as band-pass filters. The mixer is used, e.g., in a GSM mobile phone.

9 Claims, 2 Drawing Sheets



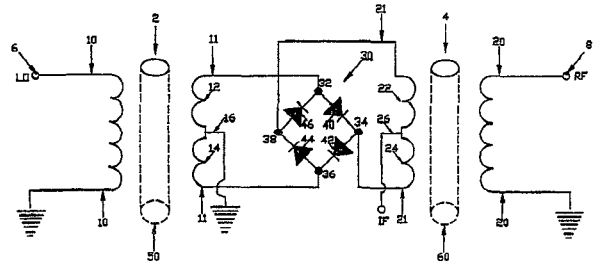
5,381,084 Jan. 10, 1995

Encasement for Circuit Having Plural Transformers

Inventors: Shankar R. Joshi and Meta Rohde.
Assignee: Synergy Microwave Corporation.
Filed: Jan. 12, 1993.

Abstract—A mass of dielectric material intimately surrounds a high-frequency circuit having plural transformers in relative close proximity to one another and provides mechanical stability and electrical protection to the circuit. The mass of dielectric material surrounding the circuit has a dielectric constant less than about 2.6 and a loss tangent less than about 0.009.

22 Claims, 10 Drawing Sheets



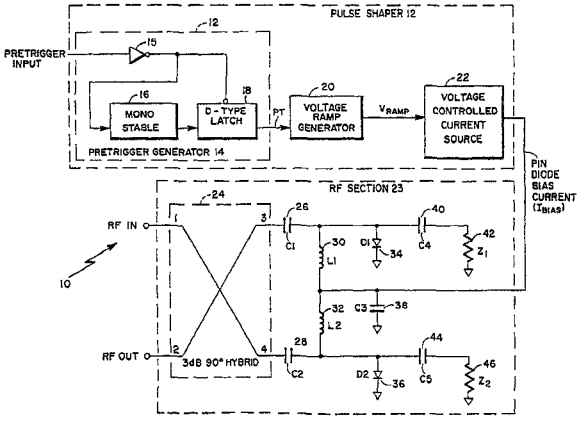
5,381,110 Jan. 10, 1995

Spurious Frequency Suppressor

Inventors: Thomas M. O'Leary, Peter R. Drake, and Philip R. Merrill (deceased).
Assignee: Raytheon Company.
Filed: Feb. 10, 1993.

Abstract—Spurious frequencies are suppressed in a transmitter by an RF pulse fall time controller circuit comprising a quadrature hybrid matched attenuator located between a predriver and the first stage of class "C" driver amplifiers. The circuit linearly attenuates RF pulses and slows pulse fall time. Operation of the circuit is initiated when the rising edge of a pretrigger starts a pretrigger generator which then triggers the application of current bias to the attenuator circuit. After a controlled period of time, the circuit decreases the forward current bias of p-i-n diodes in the attenuator thereby increasing the diodes' series resistance and increasing the attenuation of the RF pulses. This creates a slow pulse fall time, thereby suppressing spurious emissions caused by parasitic ringing of the cascaded class C common base transistor amplifiers in the transmitter.

13 Claims, 5 Drawing Sheets



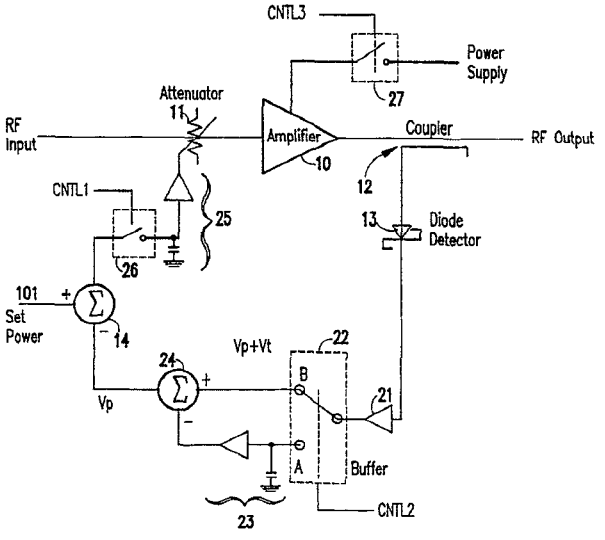
5,381,115 Jan. 10, 1995

Method and Apparatus for Regulating Output Power of Signal Amplifier

Inventors: Richard P. Timmons and Lanh T. Trinh.
Assignee: Hughes Aircraft Company.
Filed: Aug. 30, 1993.

Abstract—A method and apparatus for controlling the output power level of an amplifier that is highly insensitive to temperature variations. The method intentionally shuts down the amplifier for a very short period of time in order to reveal the detector diode's thermally induced error voltage. This voltage is then stored for a subsequent subtraction from the total detected voltage after the amplifier is turned back on. The detector diode is therefore compensated against itself to obtain a higher level of detection accuracy.

8 Claims, 5 Drawing Sheets



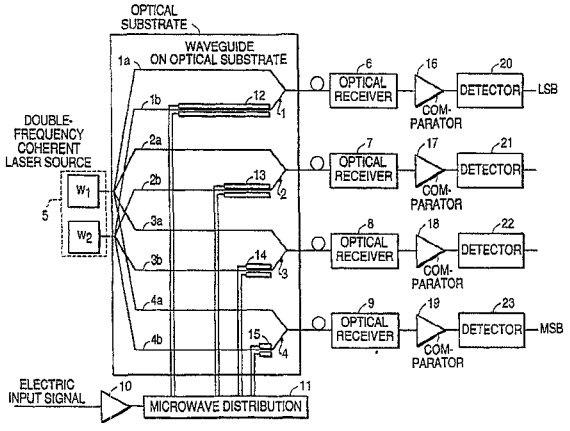
5,381,147 Jan. 10, 1995

Process for the Analog-to-Digital Conversion of Microwave Signals

Inventor: Wolfram Birkmayer.
Assignee: Deutsche Aerospace AG.
Filed: May 17, 1993.

Abstract—An optical analog to digital converter for microwave signals in which the input to a Mach-Zehnder modulator/interferometer is split into two branches with respective laser carrier signals having a difference frequency equal to a desired conversion frequency. An input microwave signal is then used to modulate the carrier signal present in one of the input branches to the interferometer, and the resulting output signal is detected and compared with a predetermined threshold value to generate a binary 1 or 0 output. In a preferred embodiment, a plurality of such interferometers are arranged in a parallel configuration and the modulation of the respective carrier signals is scaled by a factor of two.

20 Claims, 3 Drawing Sheets



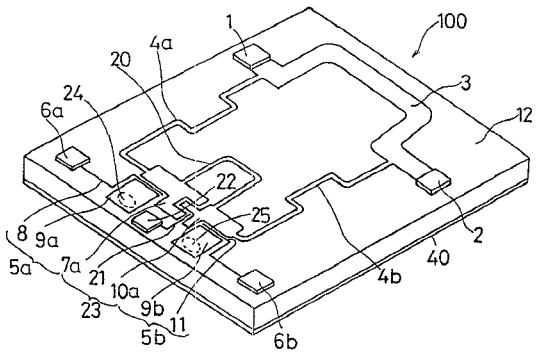
5,382,926 Jan. 17, 1995

Multiple-Bit-Loaded Line Phase Shifter

Inventors: Kazuhiko Nakahara and Shinji Aono.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: June 8, 1993.

Abstract—A loaded line phase shifter includes a semiconductor substrate; a main transmission line one-quarter wavelength long disposed on the semiconductor substrate; loaded lines connected to opposite ends of the main line; first and second FET's with drain electrodes connected to the other ends of the loaded lines and grounded source electrodes; and a resonant circuit including a third FET and an inductor connected between the drain electrodes of said first and second FET's. A desired phase shift quantity of the phase shifter is determined by the characteristic impedance of the main line, the reactance components of the loaded lines, and the off-capacitances of the FET's. When the resonant circuit is closed in this structure, the susceptance of the loaded lines and the first and second FET's is equal to zero, resulting in a phase shift quantity equivalent to half of the phase shift quantity obtained when the resonant circuit is opened. Therefore, two different phase shift quantities are achieved in one phase shifter, resulting in a small-sized, multiple-bit phase shifter.

5 Claims, 11 Drawing Sheets



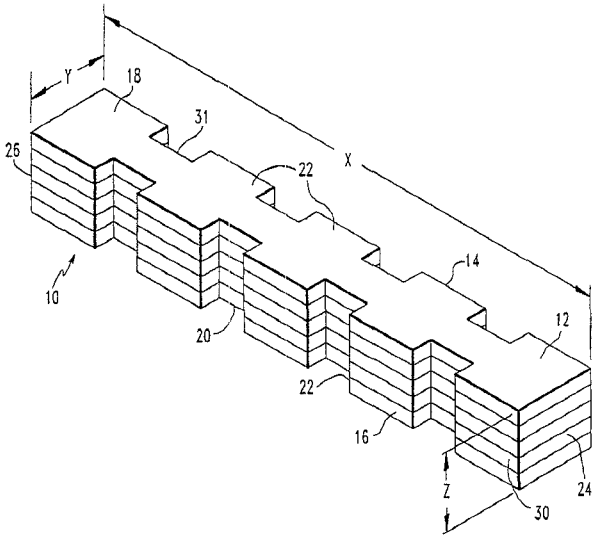
5,382,931 Jan. 17, 1995

Waveguide Filters Having a Layered Dielectric Structure

Inventors: Andrew J. Piloto, Kevin A. Leahy, Bruce A. Flanick, and Kawthar A. Zaki.
Assignee: Westinghouse Electric Corporation.
Filed: Dec. 22, 1993.

Abstract—Waveguide filters having a laminated dielectric structure for resonating at a predetermined frequency and having a series of longitudinally spaced resonators. A selected plural number of individual layers of high dielectric low temperature co-fired ceramic are laminated into a monolithic structure and then plated with a conductive material. Each of the individual layers is dimensioned and the number of layers is selected so that the unit resonates at the predetermined frequency. A waveguide filter is also described where a select plural number of contiguous layers of low temperature co-fired ceramic are laminated and plated with a conductive material. A series of vertically placed vias are positioned so as to form a perimeter of a waveguide filter. A plurality of individual layers of low-temperature cofired ceramic are laminated to the monolithic structure to form a laminated unit so that electrical components and the waveguide filter can be integrated into a single package.

15 Claims, 7 Drawing Sheets



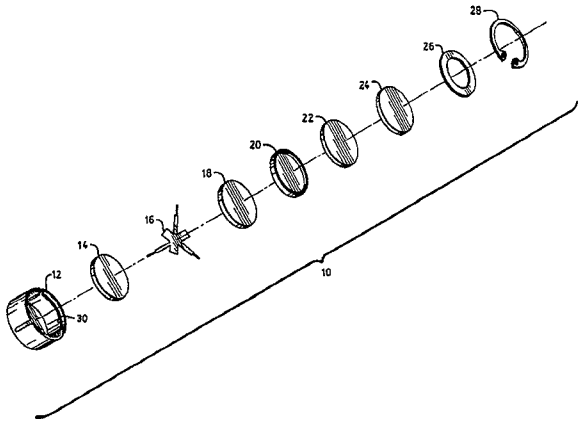
5,384,556 Jan. 24, 1995

Microwave Circulator Apparatus and Method

Inventors: Mark E. Coles and James P. Kingston.
Assignee: Raytheon Company.
Filed: Sept. 30, 1993.

Abstract—A ferrite stripline circulator having low cost, broad tolerance elements, and an easy-to-assemble design. The unit comprises of a cylindrical housing into which are stacked a ferrite disk, a center conductor, another ferrite disk, a metal ground plane, a disk magnet, a metal cover, and a compression spring. A C-clip that fits into a groove on an upper inner circumference of the cylinder forces the compression spring against the cover and thereby applies the pressure that is required to assure proper operation of the stacked elements.

10 Claims, 3 Drawing Sheets



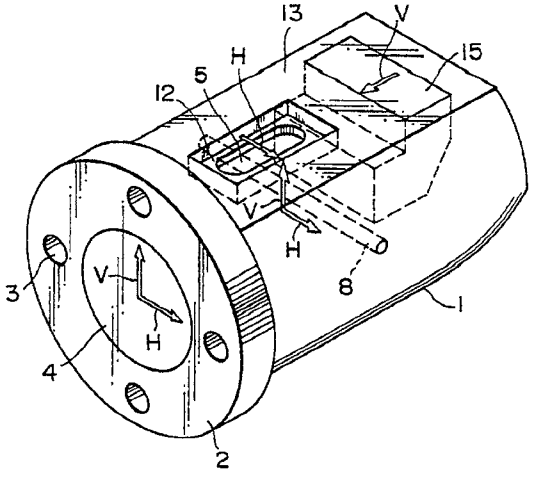
5,384,557 Jan. 24, 1995

Polarization Separator and Waveguide-Microstrip Line Mode Transformer for Microwave Apparatus

Inventors: Yoshikazu Yoshida, Kenichi Kawasaki.
Shozo Horisawa, Hiroyuki Mita, and Keiji Fukuzawa.
Assignee: Sony Corporation.
Filed: Nov. 10, 1993.

Abstract—A polarization separator for separating orthogonal polarization waves into a horizontal polarization wave component and a vertical polarization wave component is minimized in size. A metal pole in the form of a thin metal bar is disposed in a circular waveguide of a waveguide member into which the orthogonal polarization waves are introduced and reflects the horizontal polarization wave component so that it is outputted through an output terminal formed in a circumferential wall of the waveguide member. Meanwhile, the vertical polarization wave component propagates in a substantially rectangular waveguide provided rearwardly of the metal pole and is outputted from another output terminal. Since the rectangular waveguide is formed in a cutoff structure for the horizontal polarization wave component, the reflection means can be formed from the metal pole in the form of a thin bar, and consequently, the polarization separator can be minimized.

5 Claims, 16 Drawing Sheets



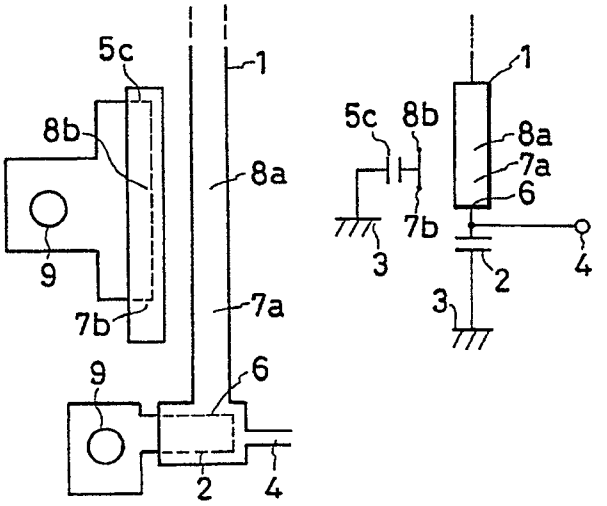
5,384,558 Jan. 24, 1995

Radio-Frequency Integrated Circuit Device Having Adjustable Matching Circuit

Inventor: Kenichi Maruhashi.
Assignee: NEC Corporation.
Filed: May 31, 1994.

Abstract—A radio-frequency integrated circuit has a transmission line that is short-circuited at an RF short-circuiting point to ground through an RF short-circuting and dc blocking capacitor. The transmission line is connected to a bias supply point. The circuit has a matching circuit constituted by the transmission line and a short-circuit stub and an adjusting capacitor. The short-circuit stub has first bonding points to which the bias voltage is applied and the adjusting capacitor has second bonding points that are selectively wire-bonded with the first bonding points. By selecting the positions at which the bonding points are interconnected, the impedance of the matching circuit can be adjusted.

7 Claims, 3 Drawing Sheets



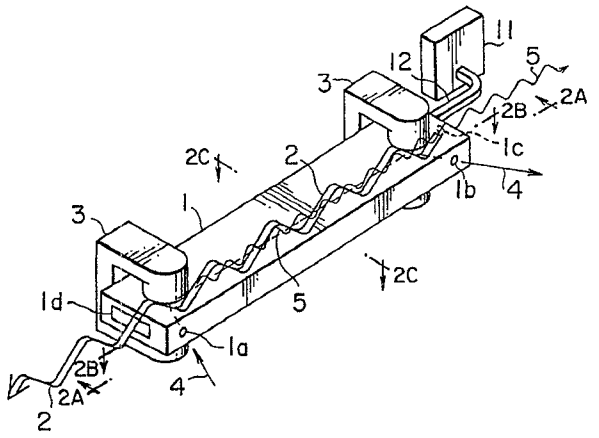
5,384,794 Jan. 24, 1995

Undulator Where the Wavelength of the Radiation Light is Changed by Varying the Frequency of the Electromagnetic Wave Travelling in the Waveguide

Inventor: Masao Takanaka.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: May 19, 1993.

Abstract—An undulator providing an increased variable wavelength range of a radiation light. An electron beam, interacting with a microwave as a traveling wave, propagates in a sinuous curve in a waveguide. In the course of propagation, a radiation light is emitted in the direction of propagation of the electron beam. The wavelength λ of the radiation light emitted may be changed greatly by varying the frequency of the microwave.

14 Claims, 3 Drawing Sheets



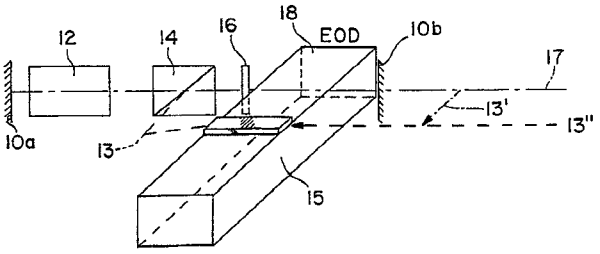
5,384,798 Jan. 24, 1995

Photoconductively Controlled Electrooptic Laser Modulation

Inventors: Oved S. F. Zucker, Iain A. McIntyre, Paul J. Solone, and David Giorgi.
Assignee: Energy Compression Research Corp.
Filed: Dec. 3, 1992.

***Abstract*—The optical modulator of the invention comprises an electrooptic material or magnetooptic material EOD that modulates optical energy in accordance with an applied electromagnetic waveform. The electromagnetic waveform impressed in the EOD is controlled by a light activated switch, or switches, which varies the magnitude of the electromagnetic waveform to the EOD by switching portions of a transmission line (of which the EOD forms all or at least a part of the dielectric) in or out. The switch, or switches, may be configured between segments of one of the conductors of the transmission line and may overlay the electrooptic dielectric material. The transmission line may include a plurality of sections, each charged to a selected voltage, so that when switched by said light activated switches, the electromagnetic waveform to the EOD is controlled. When used in a laser cavity, the optical modulation can control the output of the laser cavity in response to optical input control signals. The optical modulator may be used for Q-switching the laser cavity, mode-locking the laser, cavity dumping the laser cavity, or modualting the output of the laser cavity, or combinations of the above. The optical input control signal may comprise light from within the laser cavity, from the output of the cavity, or from an external source. The optical modulator may modulate a plurality of beams of optical energy based upon a single electromagnetic waveform or it may modulate the plurality of beams in accordance with a respective plurality of different waveforms.**

198 Claims, 12 Drawing Sheets



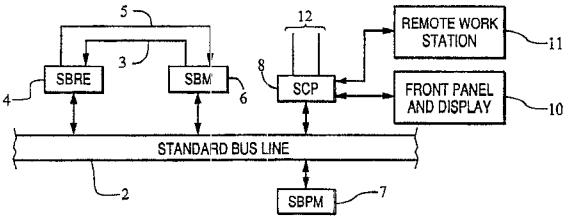
5,384,805 Jan. 24. 1995

RF Communication Systems in Open Architecture Bus Lines

Inventors: Steve K. Hawkins and Bruce R. Whitney.
Assignee: E-Systems, Inc.
Filed: Oct. 9, 1992.

***Abstract*—A system for RF communications utilizing an open architecture bus line is disclosed. The system consists of a single-board receiver exciter, a single-board modulator, and a system control processor all interfaced to a standard bus line. All three units are implemented on single-board assemblies and are programmable to perform over a variety of frequency ranges to operate at one of a variety of modulating schemes and to utilize varying data rates.**

20 Claims, 7 Drawing Sheets



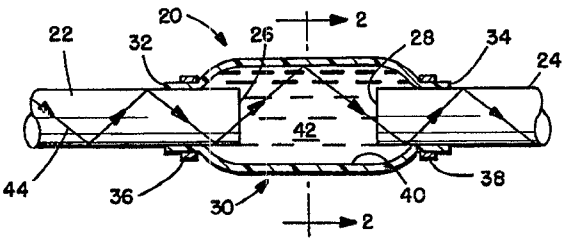
5,384,871 Jan. 24, 1995

Fiber Optic Couplings and Measurement Apparatus Using Flexible Liquid Filled Bladder

Inventor: Gabor Devenyi.
Assignee: Hughes Aircraft Company.
Filed: Nov. 15, 1993.

***Abstract*—An optical coupler (20) is provided for joining first and second opposed fiber optic ends (22, 24). A flexible tubular bladder (30) has first and second opposed ends (32, 34). The first end (32) is sealingly attached to the first fiber optic end (22) and the second end (34) is sealingly attached to the second fiber optic end (24). A light transmissive liquid completely fills a cavity (42) within the bladder (30) enabling transmission of light signals between the first and second fiber optic ends (22, 24). The bladder (30) is deformable to thereby attenuate light signals being transmitted through the light transmissive liquid. This may be achieved by means of a mechanical clamp (46) engageable with the outer peripheral surface of the bladder by a mechanical iris assembly (52), or by a pressurized atmosphere (FIG. 5) applied to selectively reduce the cross-sectional area of the cavity to a desired percentage of the initial cross-sectional area. This may also be achieved by use of an elongate member (88) wrapped around the outer peripheral surface of the bladder (30) and having opposed ends (90, 92), which can be manipulated to alter the cross-sectional area of the cavity. Apparatus using the optical coupler can be used to measure relative movement between a pair of members, as well as a pressure sensor.**

13 Claims, 2 Drawing Sheets



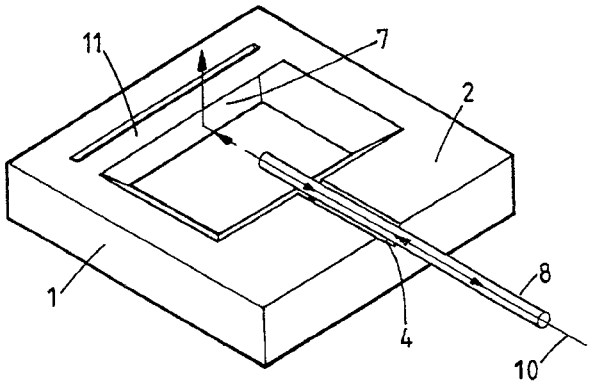
5,384,872 Jan. 24, 1995

Optical Device and a Method of Manufacture Thereof

Inventors: Alan J. Jacobs-Cook, Peter E. M. Frere, and Mark E. C. Bowen.
Assignee: Lucas Industries Public Limited Company.
Filed: Jan. 27, 1993.

***Abstract*—A block of monocrystalline silicon oriented so as to have a body surface aligned in a {110} crystallographic plane is selectively etched so as to define a groove for receiving an optical waveguide and a reflecting surface facing the groove. The groove is aligned with a ⟨110⟩ crystalographic axis. The reflecting surface is in a {100} crystallographic plane. Thus, the groove is parallel to the body surface and the reflecting surface is at 45° to the body surface.**

16 Claims, 4 Drawing Sheets



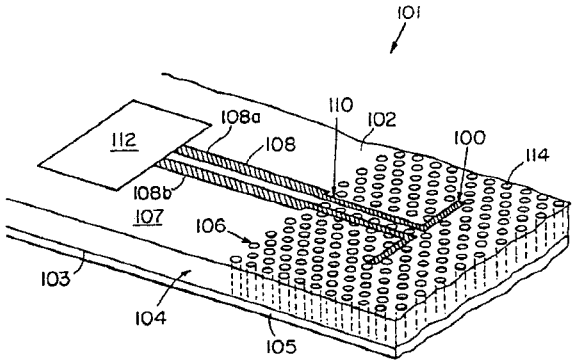
5,386,215 Jan. 31, 1995

Highly Efficient Planar Antenna on a Periodic Dielectric Structure

Inventor: Elliott R. Brown.
Assignee: Massachusetts Institute of Technology.
Filed: Nov. 20, 1992.

***Abstract*—**Efficient transmission and reception of electromagnetic radiation are achieved by an antenna on a substrate. An antenna is fabricated on the top surface of a substrate that includes a periodic dielectric structure. The antenna operates at a frequency within the band gap of the periodic dielectric structure. Radiation emitted by the antenna cannot propagate through the structure and is therefore emitted only into space away from the substrate. When the antenna is receiving, radiation striking the device does not propagate through the substrate but is concentrated at the antenna. A phased array with isolated elements is achieved by fabricating the array elements on top of a substrate having a periodic dielectric structure and by surrounding the circuits associated with each antenna element with the periodic dielectric structure. Radiation from an element or associated circuitry at a frequency within the band gap of the structure cannot propagate into the substrate to interfere with other elements.

53 Claims, 9 Drawing Sheets



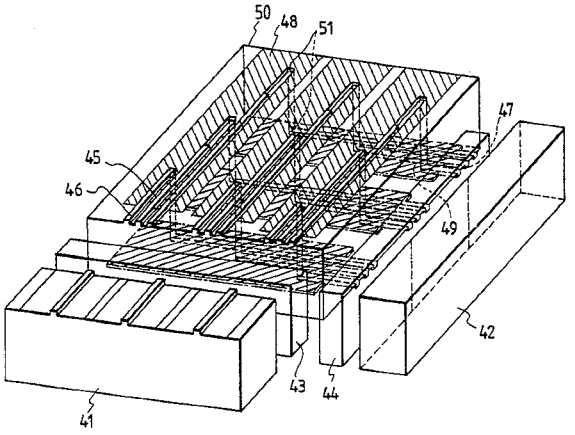
5,386,310 Jan. 31, 1995

Parallel Optical switching Apparatus

Inventors: Makoto Haneda, Yuuichi, Ono, and Katuaki Chiba.
Assignee: Hitachi, Ltd.
Filed: Dec. 3, 1992.

***Abstract*—**A parallel optical switching apparatus wherein at least one m-channel light emission element array and one n-channel light receiving element array are optically connected via an m × n optical conversion element array and the optical conversion element array has an optical amplification function by inductive discharge of input light for each element and performs optical arithmetic or optical conversion in parallel for input light from the light emission element array by the amplification and modulation function.

8 Claims, 3 Drawing Sheets



5,386,313 Jan. 31, 1995.

Reflective Magnetooptic Spatial Light Modulator Assembly

Inventors: Nicholas J. Szegedi, Lawrence I. Garett, Theodore R. Maki, and Dennis N. Smith.
Filed: Mar. 11, 1993.

***Abstract*—**A reflective magnetooptic spatial light modulator (MOSLM TM) assembly has a nonmagnetic protective housing that receives, positions, and protects a spatial light modulator (SLM) chip that is formed from relatively fragile magnetooptic material from deformations caused by mechanical stress and by excessive temperature changes. The assembly further has a channelled ingress and egress of incident electromagnetic radiation, such as visible and coherent light, to and from the SLM chip.

11 Claims, 3 Drawing Sheets