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.

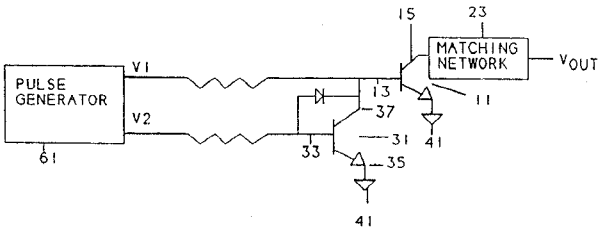
5,319,315 June 7, 1994

Class-C RF Power Amplifier Having Digitally Driven Shunt Circuit for Removing Accumulated Excess Base Charge

Inventor: Donald K. Belcher.
Assignee: Harris Corporation.
Filed: Nov. 18, 1992.

Abstract—Analog (LC) circuit components for an input matching and base charge removal network for a Class-C amplifier are replaced by a digitally driven shunt circuit, which is coupled between the base electrode of the Class-C power transistor and a reference voltage terminal (ground). The digitally driven shunt circuit is operative to couple the base electrode of the power transistor to the reference voltage terminal upon the termination of the limited duty cycle input pulse employed as the base drive to the power amplifier. To facilitate implementation as a digital application specific integrated circuit (ASIC), the controlled shunt circuit comprises an auxiliary or second bipolar transistor having its emitter-collector path coupled in circuit with the base of the bipolar power transistor and the reference voltage terminal. This second transistor has its base coupled to receive a control pulse, which turns on the shunt transistor hard at the termination of the input pulse, thereby providing a shunt or discharge path for base charge that accumulated on the base of the power amplifier transistor during the input pulse applied to its base. Both the input pulse and the control pulse have a duration on the order of one-fourth of the duty cycle of the output voltage swing. In terms of the period of the output voltage swing, the control pulse is effectively delayed with respect to the input pulse by 90°.

9 Claims, 2 Drawing Sheets



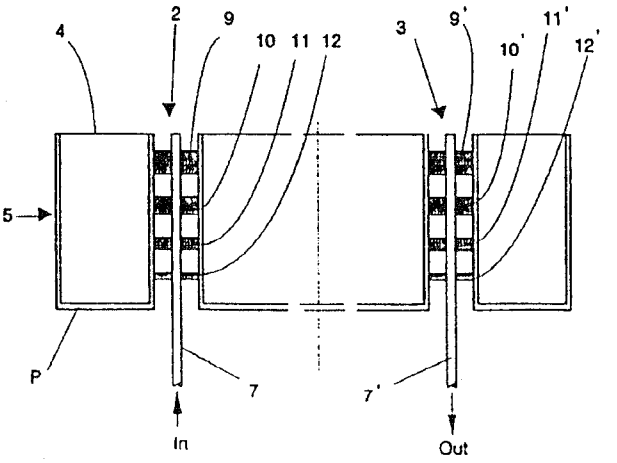
5,319,328 June 7, 1994

Dielectric Filter

Inventor: Aimo Turunen.
Assignee: LK-Products OY.
Filed: June 25, 1992.

Abstract—Harmonic frequencies of a ceramic filter (**1**) can be efficiently attenuated by placing in a hole (**2**; **3**) of a first and/or last resonator a conductive rod (**7**; **7′**), on which disk-like insulating plates (**9**, **10**, **11**, **12**; **9′**, **10′**, **11′**, **12′**) are provided in spaced relationship along the length of the rod. The harmonic filter thus formed is a low pass filter, comprising transverse capacitances formed by the insulating plates and longitudinal inductances formed by the rod portions between the plates. Coupling between the harmonic filter and the resonators of the main filter takes place at the upper end of the rods (**7**, **7′**).

10 Claims, 2 Drawing Sheets



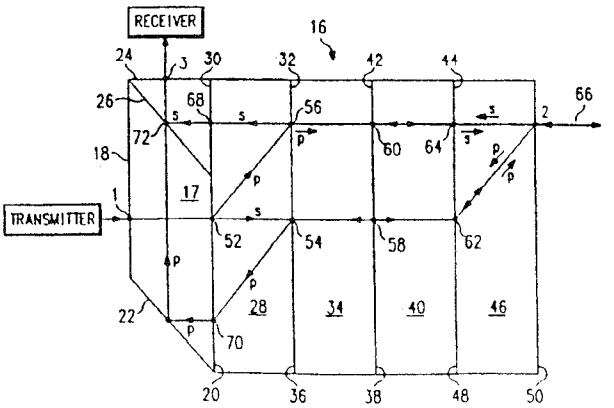
5,319,483 June 7, 1994

Polarization Independent Low Cross-Talk Optical Circulator

Inventors: Jerzy S. Krasinski, Gary W. Pearson, Phillip E. Baker.
Assignees: Williams Telecommunications Group, Inc., and Bd. of Regents, Oklahoma State University.
Filed: Dec. 4, 1992.

Abstract—There is provided an optical circulator (**16**) for bidirectional communication on a fiber optic communication transmission system. A reflection rhomb (**17**) includes a polarizing thin film (**26**) and an inclined, internally reflecting end surface (**22**). A first birefringent crystal (**28**) is disposed against the reflection rhomb (**17**). A quartz rotator (**34**) is disposed against the opposite side of the first birefringent crystal (**28**). A Faraday rotator (**40**) is disposed against the opposite side of the quartz rotator (**34**). A second birefringent crystal (**46**) is disposed against the opposite side of the Faraday rotator (**40**). The components of optical circulator (**16**) cooperate such that light transmitted into port **1** exits from port **2**, and light transmitted into port **2** exits from port **3**.

34 Claims, 2 Drawing Sheets



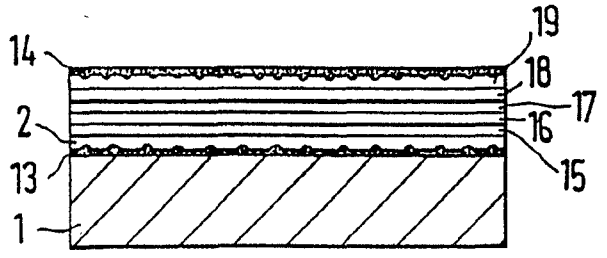
5,319,492 June 7, 1994

Optical Switch

Inventors: Reimund Dorn, Peter Kersten, Werner Rehm, Wiltraud Wischmann.
Assignee: Alcatel N.V.
Filed: May 18, 1992.

***Abstract*—An optical switch has a substrate and a transparent material in which a three-dimensional diffraction pattern is recorded which is capable of diffracting light, the material having non-linear optical properties and extending in the form of a first layer above the substrate. At least one first electrode and at least one second electrode are provided for varying the diffraction pattern in accordance with applied voltages.**

18 Claims, 1 Drawing Sheet



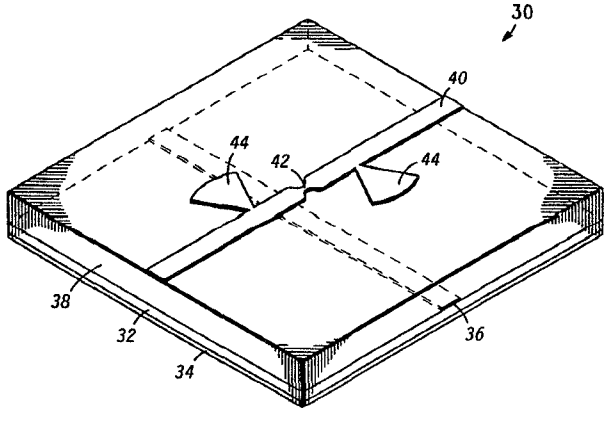
5,321,375 June 14, 1994

RF Crossover Network

Inventor: David W. Corman.
Assignee: Motorola, Inc.
Filed: Nov. 30, 1992.

***Abstract*—A RF crossover network includes a RF line, a DC/control line capacitively coupled to the RF line at a cross over of the RF line, and RF terminations coupled to the DC/control line. A RF signal carried on the RF line is unperturbed by the presence of a DC/control signal on the DC/control line. The RF line is mounted on a first dielectric layer including a ground plane. A second dielectric layer includes first and second surfaces with the DC/control line mounted on the first surface of the second dielectric layer and the second surface of the second dielectric layer positioned adjacent to the RF line. RF terminations are used on opposite ends of a half wave resonator. The RF terminations can comprise shunt capacitors, metal-insulator-metal (MIM) capacitors in a monolithic microwave integrated circuit (MMIC) embodiment, or open-circuited quarter wavelength transmission lines.**

7 Claims, 3 Drawing Sheets



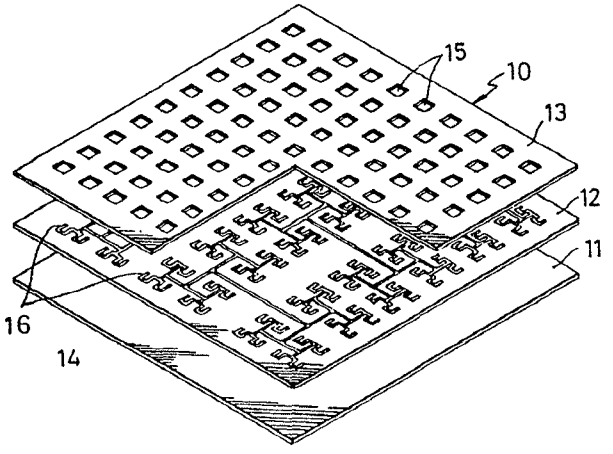
5,321,411 June 14, 1994

Planar Antenna for Linearly Polarized Waves

Inventors: Katsuya Tsukamoto, Hirowo Inoue, Kaname Okuno, Toshio Abiko.
Assignee: Matsushita Electric Works. Ltd.
Filed: Jan. 22, 1993.

***Abstract*—A planar antenna for linearly polarized waves includes a grounding conductor plate, a power supply circuit plate having a pattern of power supplying circuit of conductor strips each including power supply terminals, and a radiation plate having apertures forming radiation elements, the respective plates being arranged sequentially with an insulating layer interposed between adjacent ones of the plates to separate them to be independent of one another through a predetermined interval, while arranging the power supplying terminals of the power supplying circuit pattern as well as the apertures in the radiation plate so that the respective power supply terminals terminate to be within a contour of the apertures, in a top plan view, whereby the planar antenna makes it possible to receive at a high gain the linearly polarized waves over a wide band.**

7 Claims, 6 Drawing Sheets



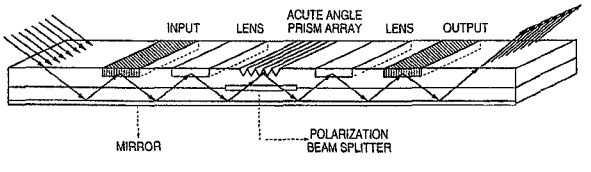
5,321,498 June 14, 1994

Planar Integrated Crossover Optical System

Inventors: Seok-Ho Song, El-Hang Lee, Kyong-Hon Kim.
Assignee: Electronics & Telecommunications Research Institute.
Filed: Dec. 23, 1992.

***Abstract*—The present invention relates to planar integration of an optical system. The optical system is an integration of a crossover switching network having several optical elements such as mirrors, lenses, beam splitters etc., spatially separated on a single wafer using an acute-angle prism array disposed on the surface of a substrate in which the optical elements are integrated.**

7 Claims, 7 Drawing Sheets



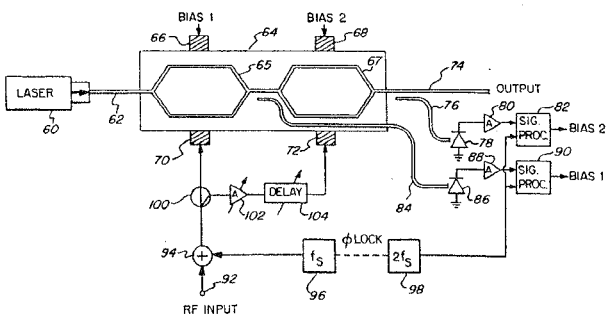
5,321,543 June 14, 1994

Apparatus and Method for Linearizing an External Optical Modulator

Inventor: David R. Huber.
Assignee: General Instrument Corporation.
Filed: Oct. 20, 1992.

Abstract—An external optical modulator is linearized to reduce second order distortion. An optical carrier is modulated in the modulator by a pilot signal. The modulated optical carrier is sampled and an error signal is generated indicative of a phase difference between a second harmonic of the pilot signal and second order harmonics thereof present in the sampled modulated optical carrier. The error signal is fed back to the modulator to adjust the bias thereof to minimize the phase difference and thereby minimize second order distortions produced by the modulator. Where a plurality of external modulators are operated in series, each is provided with a feedback loop to minimize the second order distortions produced therein.

20 Claims, 3 Drawing Sheets



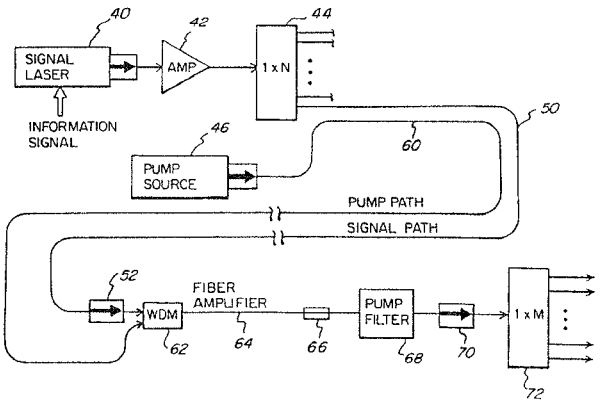
5,321,707 June 14, 1994

Remote Pumping for Active Optical Devices

Inventor: David R. Huber.
Assignee: General Instrument Corporation.
Filed: July 27, 1992.

Abstract—Optical amplifiers and other active optical components along a signal distribution path are remotely pumped by a common pump laser. The pump energy can be transmitted over the signal path or over a separate pump path. Pumping of rare earth doped optical fiber amplifiers, such as erbium doped fiber amplifiers is illustrated. The pump energy can be provided at about 1480 nanometers to take advantage of reduced attenuation at this wavelength along the fiber path.

10 Claims, 3 Drawing Sheets



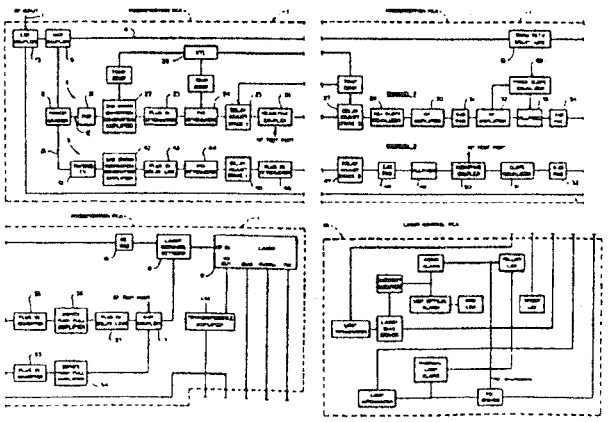
5,321,710 June 14, 1994

Predistortion Method and Apparatus for Laser Linearization

Inventors: Peter W. Cornish and Barry Duncan.
Assignee: Raynet Corporation.
Filed: Apr. 19, 1993.

Abstract—A predistortion circuit reduces composite second order intermodulation distortion products inherently generated by a laser diode. A radio frequency signal is split into a primary and secondary signal, and the secondary signal is amplified by an amplifier biased at a starvation current level so as to produce intermodulation distortion products having an amplitude relatively large compared to an amplitude of a fundamental generated by the amplifier. The amplitude and phase of composite second order intermodulation distortion products generated by the amplifier are adjusted so as to substantially match those inherently generated by the laser diode by the primary electrical signal, with the products being about 180° out of phase relative to those generated by the laser in response to the primary signal. The adjusted distortion products are combined with the primary electrical signal, and the combined signal is fed to the laser diode resulting in an output of the laser diode having minimum composite second order intermodulation distortion products.

12 Claims, 22 Drawing Sheets



5,323,119 June 21, 1994

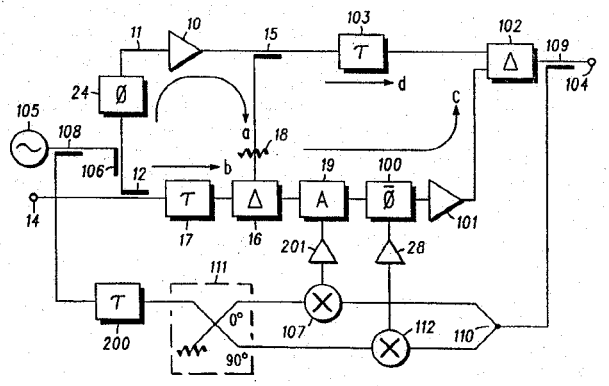
Amplifier Having Feed Forward Cancellation

Inventors: Jack Powell, Thomas Ha, Georg Luettgenau.
Assignee: Motorola, Inc.
Filed: Nov. 12, 1990.

Abstract—The present invention provides an amplifier arrangement to which feed forward correction is applied by a comparison loop including comparison means for comparing amplifier input with amplifier output to provide an error signal, a cancellation loop including secondary amplifier means for amplifying the error signal and combining means for combining said amplified signal with said amplifier output, a pilot generator coupled to said amplifier input to introduce a pilot tone therein, detector means for detecting a level of pilot tone in said amplifier output and correction means for correcting said cancellation loop performance as a function of said detection wherein said pilot generator is further coupled to a multiplier receiving said amplifier output, said multiplier producing an output signal arranged to control a loop parameter to effect said correction. The distortion

performance of a feed forward amplifier is thereby improved, alternatively an amplifier of inferior distortion performance, but potentially higher efficiency may be used.

8 Claims, 2 Drawing Sheets



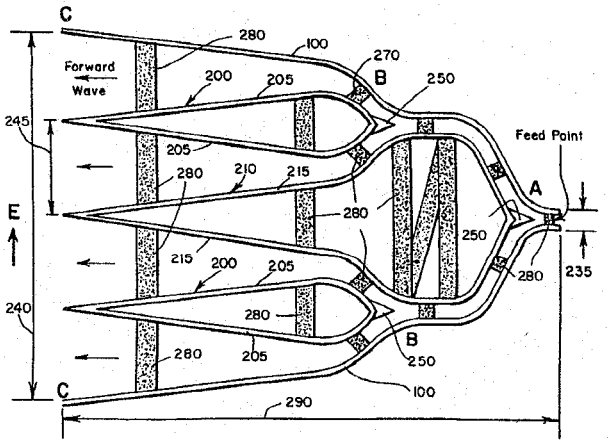
5,323,169 June 21, 1994

Compact, High-Gain, Ultra-Wide-Band (UWB) Transverse Electromagnetic (TEM) Planar Transmission-Line-Array Horn Antenna

Inventor: Robert A. Koslover.
Assignee: Voss Scientific.
Filed: Jan. 11, 1993.

***Abstract*—An antenna for the radiation of ultrawideband pulsed electromagnetic radiation. The invention is a high gain, transverse electromagnetic parallel-plate, open-sided transmission-line array horn antenna utilizing a binary tree-based design, which produces a multiple number of paralleled horns and final radiation apertures, connected to a single signal feed waveguide. This invention antenna structure produces an equal path length for the signals in each of the paralleled branches, virtually eliminating phase error in the E plane and producing high gain characteristics over most of the desired radiation frequency range.**

8 Claims, 4 Drawing Sheets



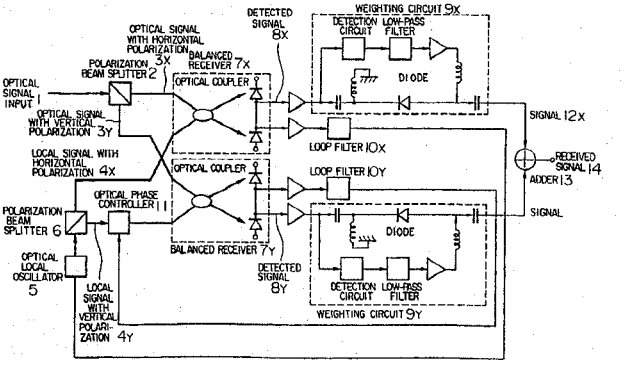
5,323,258 June 21, 1994

Homodyne Optical Receiver Equipment

Inventors: Hideaki Tsushima, Ryoji Takeyari, Shinya Sasaki, Shigeki Kitajima, Katsuhiko Kuboki.
Assignee: Hitachi, Ltd.
Filed: Oct. 4, 1991.

***Abstract*—A homodyne optical receiver includes a polarization beam splitter for dividing an optical signal into an optical signal with horizontal polarization and an optical signal with vertical polarization. Optical couplers combine two optical signals of the two polarized components with two optical local signals, which signals are almost matched therewith in polarization, and in a state where they are matched with each other in phase. Detectors homodyne detect respective output optical signals of the optical couplers and two weighting circuits assign output signals of the detectors weights which are approximately proportional to amplitudes thereof, respectively. An adder adds output signals of the weighting circuits.**

7 Claims, 7 Drawing Sheets



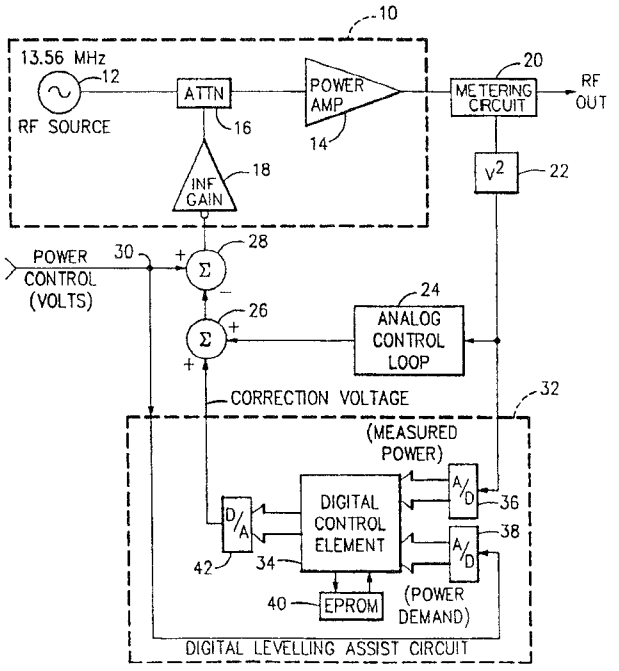
5,323,329 June 21, 1994

Digitally Assisted Power Levelling Circuit for RF Power Generator

Inventor: Anthony R. A. Keane.
Assignee: ENI, Div. of Astec America, Inc.
Filed: Dec. 23, 1991.

***Abstract*—An RF generator has an analog feedback circuit in combination with a digital levelling assist circuit to compensate for non-linearities in the power metering circuit that measures the RF output energy. The digital leveling assist circuit has a digitizer with inputs coupled to receive the measured power voltage supplied from the power metering circuit and a power demand voltage. The digitizer has outputs that provide digital representations of the measured power voltage and the power demand voltage to a digital control element that derives a digital correction factor based on these digital representations. A d/a converter coupled to the digital control element provides a correction voltage corresponding to this digital correction factor, and this is furnished to a summing circuit that combines the correction voltage with the power demand voltage and with a control voltage that is supplied by the analog feedback circuit. The leveling assist circuit increases the accuracy of control of the RF output power with respect to the power demand voltage, without sacrificing the speed of the analog feedback circuit.**

5 Claims, 2 Drawing Sheets



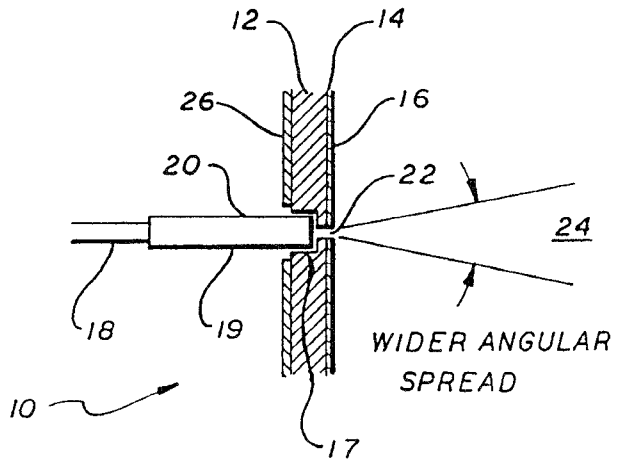
5,324,937 June 28, 1994

Target for Calibrating and Testing Infrared Devices

Inventors: Wallace W. Chen and I-Fu Shih.
Assignee: Hughes Aircraft Company.
Filed: Jan. 21, 1993.

Abstract—An improved target for testing and calibrating a detection device. The target (**10**)includes a metal substrate(**12**) with a first layer (**14**) of high emissivity material and a second layer (**16**) of low emissivity material are deposited thereon. In the specific implementation, the substrate (**12**) is copper, the first layer (**14**) is chromium-oxide and the second layer (**16**) is chrome. In the illustrative embodiment, an aperture (**22**) is drilled through the substrate (**12**) and the first and second layers (**14**, **16**) thereon. An infrared emitter (**20**) is located at the aperture (**22**) to provide point source radiation. A conventional heater (**26**) is applied to the back surface of the target. A pattern is etched on second layer (**16**) on the front surface of the target using electron beam lithography. The use of a metal substrate (**12**) allows for the drilling of small holes more easily than in the conventional target. In addition, the metal substrate (**12**) provides good temperature uniformity without use of a separate metal plate due to the higher thermal conductivity of metal over glass. The elimination of the separate metal plate also simplifies target assembly and reduces target costs.

20 Claims, 1 Drawing Sheet



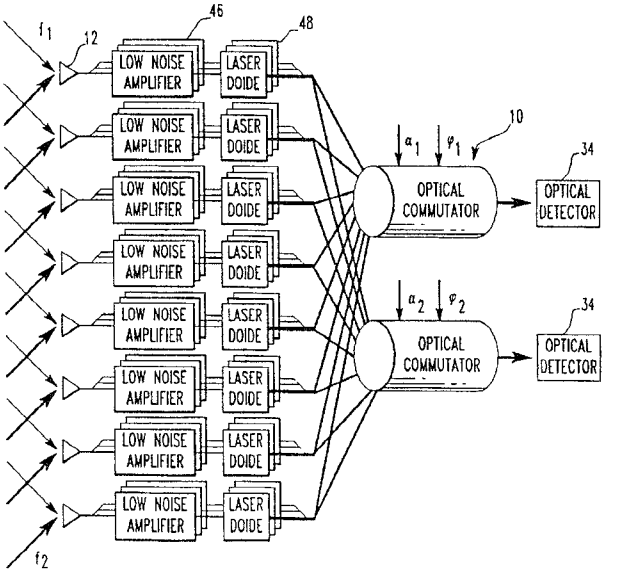
5,325,102 June 28, 1994

Receiver System Employing an Optical Commutator

Inventor: Derrick J. Page.
Assignee: Westinghouse Electric Corporation.
Filed: June 4, 1993.

Abstract—A device for delaying signals received from elements of an array antenna by providing delay paths of selectable lengths between respective antenna elements and signal processing means. A plurality of first optical fibers are provided, each having a selected length. A plurality of second optical fibers having selected lengths are also provided. The first fibers are alignable with the second fibers to form respective delay paths. At least one of the set of first fibers and set of second fibers is moveable relative to the other so that when moved, selected first fibers are aligned with selected second fibers creating a delay path of a selected length from each antenna element to the signal processing means.

20 Claims, 7 Drawing Sheets



5,325,451 June 28, 1994

Modular Optical Waveguide and Method for Making

Inventors: Davis Hartman, Michael S. Lebby, Thomas H. Blair, Dennis B. Miller.
Assignee: Motorola, Inc.
Filed: Jan. 5, 1993.

Abstract—A method for making a modular optical waveguide (**100**) including a plurality of optical modules (**102**, **103**, **104**, **105**) with each optical module having at least a core region (**101**)that is surrounded by a cladding region (**111**, **112**). A first groove **114** and a second groove **116** are disposed into cladding region (**111**, **112**), thereby separating the optical modules (**102**, **103**, **104**, **105**).

13 Claims, 1 Drawing Sheet