Patent Abstracts

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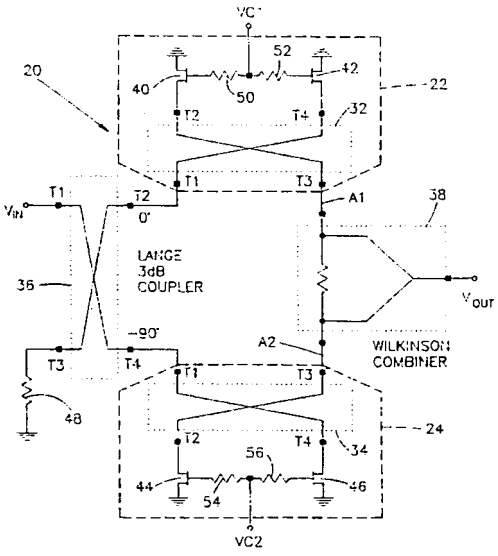
5,504,465 Apr. 2, 1996

Microwave Modulator Having Adjustable Couplers

Inventors: Ming L. Yung, Bernard M. Albrecht, Jr., Andrew M. Kennedy, II, and Elizabeth C. Townley.
Assignee: Space Systems/Loral, Inc.
Filed: Aug. 22, 1994.

***Abstract*—**A multifunction microwave modulator circuit has an input signal splitter to provide two equal amplitude signal components. A phase quadrature relationship between the two signal components is obtained by constructing the splitter as a Lange coupler. There is pair of circuit cells, each of which operates separately on one of the two signal components to electronically adjust a vector representation of the signal to provide a vector having a desired amplitude, ranging over both positive and negative values of amplitude, including zero amplitude. The signal vectors of the two cells are combined by means of a Wilkinson combiner to provide an output signal represented by a resultant vector, which may have any direction within 360°, and an amplitude scale factor which varies from unity to zero. Each circuit cell has a Lange coupler with output terminals terminated with an impedance, such as back-biased transistors, variable in response to a control voltage to reflect power via a second input terminal to the Wilkinson combiner. The circuit may be operated in reciprocal fashion by applying an input microwave signal to the Wilkinson combiner and extracting the output signal from the Lange coupler of the power splitter.

16 Claims, 3 Drawing Sheets



Publisher Item Identifier S 1051-8207(97)02514-2.

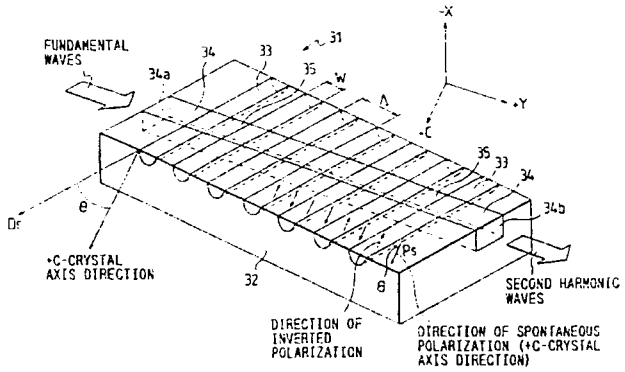
5,506,722 Apr. 9, 1996

Optical Wavelength Converting Device for Converting Fundamental Waves into Harmonic Waves and Shorter Wavelength Coherent Light-Generating Apparatus with the Device

Inventors: Kiminori Mizuuchi, Kazuhisa Yamamoto, and Hisanao Sato.
Assignee: Mitsubishi Electric Industrial Co., Ltd.
Filed: Feb. 10, 1995.

***Abstract*—**An optical wavelength-converting device is provided with a $LiTaO_3$ substrate, a plurality of inverted-polarization layers periodically arranged in an upper surface of the $LiTaO_3$ substrate, and an optical waveguide crossing the inverted-polarization layers. The upper surface of the $LiTaO_3$ substrate is directed toward a $-$X-crystal axis direction. The inverted-polarization layers are formed by exchanging Ta^+ ions of the $LiTaO_3$ substrate for H^+ ions, and an extending direction of each inverted-polarization layer is inclined at an angle of $\theta°(6 \leqq \theta \leqq 174)$ to the $+$C-crystal axis direction toward a $-$Y-crystal axis direction. The optical waveguide is formed by exchanging Ta^+ ions of the $LiTaO_3$ substrate and the inverted polarization layers for H^+ ions to set a refractive index of the optical waveguide higher than that of the $LiTaO_3$ substrate. The optical waveguide extends in a $+$Y-crystal axis direction. Fundamental waves polarized in a transverse electric mode induce electric field directed in $\pm$Y-crystal axis directions and are converted into second harmonic waves in the optical waveguide.

31 Claims, 21 Drawing Sheets



5,506,724 Apr. 9, 1996

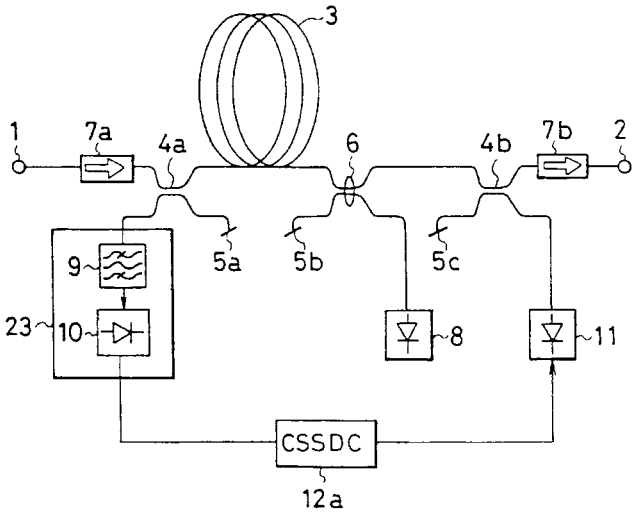
Gain Controllable Optical Amplifier and Applications Thereof

Inventors: Katsuhiro Shimizu, Takashi Mizuochi, Kuniaki Motoshima, and Tadayoshi Kitayama.
Assignee: Mitsubishi Denki Kabushiki Kaisha.
Filed: Sept. 21, 1994.

***Abstract*—**An optical fiber that amplifies an input signal by a pump source, a compensation-signal source that injects a compensation-signal propagating contra-directionally with respect to the input signal. Into the optical fiber, a gain detector that measures a spontaneous emission light of the pump source at an input side of the optical fiber and a compensation-signal source controller that controls output of the compensation-signal source based on output of

the gain detector are provided. In addition, a coupler and a wavelength-selective reflector, which reflects a light of the same wavelength as the compensation-signal selectively, are provided at the input side of the optical fiber.

47 Claims, 15 Drawing Sheets



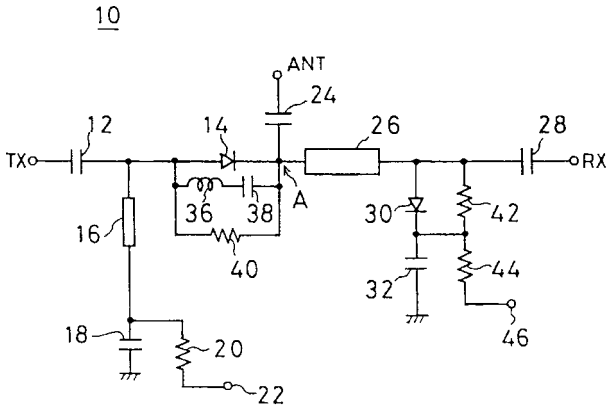
5,507,011 Apr. 9, 1996

High-Frequency Switch Including Strip Line and Two Switching Diodes

Inventors: Yoshikazu Chigodo and Harufumi Mandai.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Dec. 21, 1993.

***Abstract*—**A transmitting circuit is connected to an antenna via a first diode. The antenna is connected to a receiving circuit with the circuit including a strip line and a second diode. Two diodes are turned ON by applying a positive voltage to a first control terminal. In this state, a signal from the transmitting circuit is transmitted from the antenna. The transmission signal is not transferred to the receiving circuit side due to a series resonance circuit with the inductance of the second diode and a capacitor. When the high-frequency switch is used for reception, a positive voltage is applied to a second control terminal. The voltage is divided by a resistors respectively connected to the diodes in parallel and applied to the diodes as a backward voltage. And hence, the diodes are surely maintained in the OFF state. The isolation between the transmitting circuit and the antenna is improved by a parallel resonance circuit with the capacitance of the first diode and a inductor.

13 Claims, 11 Drawing Sheets



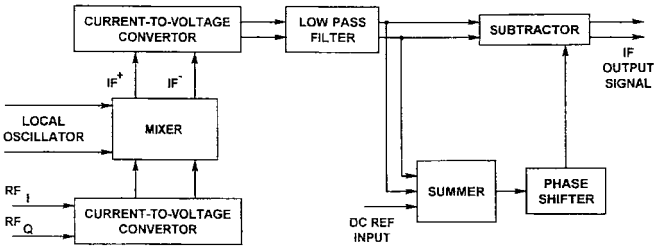
5,507,036 Apr. 9, 1996

Apparatus with Distortion Cancelling Feed-Forward Signal

Inventor: Michael R. Vagher.
Assignee: Rockwell International.
Filed: Sept. 30, 1994.

***Abstract*—**An apparatus and a method for cancelling distortion in a direct conversion receiver, such distortion created by the mixing of the desired signal with the output signal of an local oscillator. Subsequent to filtering the mixer output signal, the even-mode distortion component is extracted, phase shifted, amplified, and recombined with the mixed signal in such manner as to suppress even-order distortion.

7 Claims, 4 Drawing Sheets



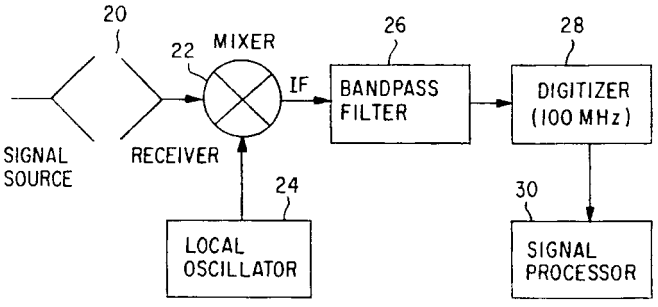
5,508,605 Apr. 16, 1996

Method for Measuring RF Pulse Frequency

Inventors: Pei-Hwa Lo and Elliott J. Greene.
Assignee: AlliedSignal Inc.
Filed: May 24, 1994.

***Abstract*—**A method for measuring the frequency of a stream of radio frequency (RF) pulses using multipurpose, commercial off-the-shelf test devices, such as an RF signal down converter, a digitizer, and a signal processor. The method is based on digital signal processing and determining the zero-crossings of the signal using signal interpolation of the pulse points. The method is suitable for real-time calculations of the frequency.

2 Claims, 3 Drawing Sheets



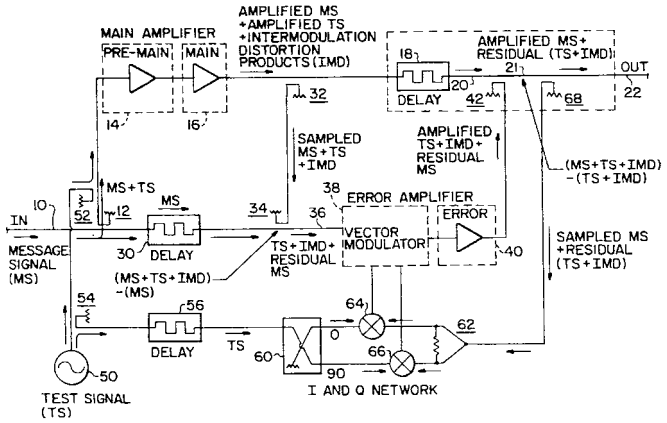
5,508,657 Apr. 16, 1996

Feed-Forward Cancellation Amplifier Utilizing Dynamic Vector Control

Inventor: Scott T. Behan.
Assignee: AML Communications, Inc.
Filed: Jan. 30, 1995.

***Abstract*—**A feedforward cancellation amplifier system for amplifying radio frequency telephony signals, including a main amplifier, an error correction circuit producing a message error signal, an error amplifier for producing an amplified message error signal that is then subtracted from the amplified and distorted message signal output of the main amplifier prior to a final output circuit, a negative feedback circuit responsive to a test signal for compensating and minimizing variation or drift in the operation of the error amplifier, the error correction circuit including a vector modulator responsive to modified quadrature vector components of the message error signal for producing a single voltage vector error signal, and the negative feedback circuit, including an I & Q network for modifying the quadrature vector components of the error signal in the error correction circuit. The preferred form of the invention utilizes p-i-n diodes to provide voltage-controlled attenuators in the vector modulator. An auxiliary negative feedback circuit is also provided for compensating variation or drift of the main amplifier.

11 Claims, 5 Drawing Sheets



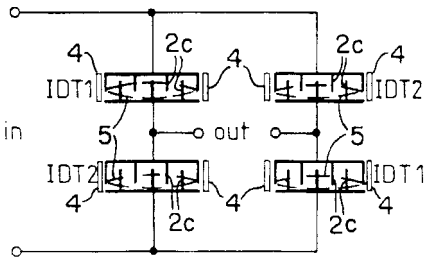
5,508,667 Apr. 16, 1996

Balanced Bridge Saw Filter

Inventors: Serguei Kondratiev and Victor Plessky.
Assignee: Advanced SAW Products SA.
Filed: July 26, 1994.

***Abstract*—**The invention relates to a SAW filter comprising a first and second pair of substantially equivalent SAW transducers electrically coupled to form a bridge circuit. Each of the transducers of the first pair of transducers have a center frequency that is slightly different to the center frequency of each of the transducers of the second pair of transducers. The product of the static capacitance of the first pair is the same as the product of the static capacitance of the second pair. In use, signals input to the filter and having a frequency within the passband of the filter are coupled to the output of the bridge circuit via one or other or both arms of the bridge, as in normal bridge circuit operation. However, out-of-band signals are blocked since all the transducers are equivalent capacitors having the same capacitance (i.e., static capacitance). Thus, transmission of out-of-band signals through the filter is inhibited by the balanced nature of the bridge.

14 Claims, 5 Drawing Sheets



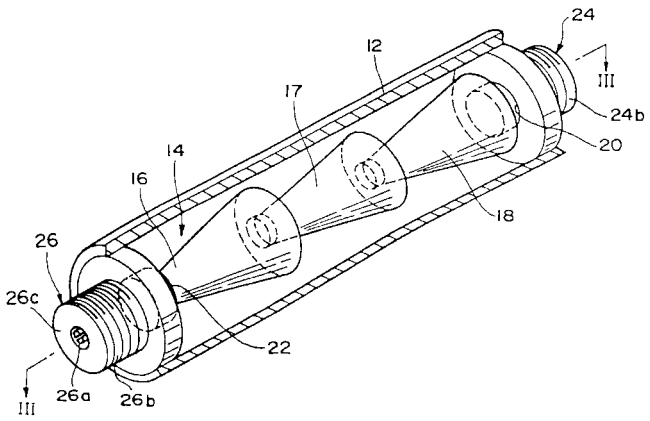
5,508,669 Apr. 16, 1996

High-Frequency Signal Transmission System

Inventor: Goro Sugawara.
Filed: Feb. 24, 1994.

***Abstract*—**A high-frequency signal transmission system for use as a microwave antenna or filter has a plurality of cascaded conical or planar inner conductors, each having a unitary exponential gradient, a pair of circular lines or impedance-matching lines having identical dimensions and connected, respectively, to opposite ends of the conical or planar inner conductor for providing a predetermined characteristic impedance, and a cylindrical or rectangular tubular outer conductor covering the conical or planar inner conductor and the circular or impedance-matching lines with a cavity defined between the conical or planar inner conductor and the cylindrical or rectangular tubular outer conductor.

22 Claims, 8 Drawing Sheets



5,510,756 Apr. 23, 1996

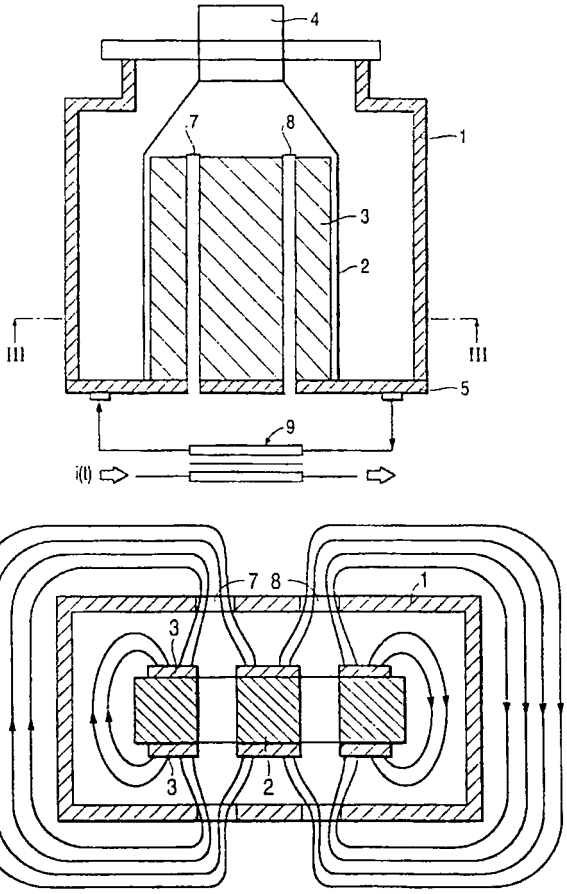
Strip Transmission Line Having a Tunable Electric Length

Inventors: Wolfgang Arnold, Erich Pivit, Wolfgang Weiser, and Seigbert Martin.
Assignee: AFT Advanced Ferrite Technology.
Filed: Oct. 12, 1994.

***Abstract*—**A strip transmission line for guiding a wave therein, including a strip-shaped inner conductor, an outer conductor surrounding the inner conductor with a clearance, a ferrite coating carried on at least one of the

conductors, and at least one throughgoing slot provided in the inner and outer conductors for dividing the inner and outer conductors into at least two inner conductor sections and at least two outer conductor sections. The slots extend in a direction of wave propagation, whereby a variable current applied to the inner and outer conductors flows in one direction in one of the inner and outer conductor sections and returns in an opposite direction in another of the inner and outer conductor sections for generating a variable premagnetizing field within the strip transmission line between the inner and outer conductors to vary an electric length of the strip transmission line.

5 Claims, 3 Drawing Sheets



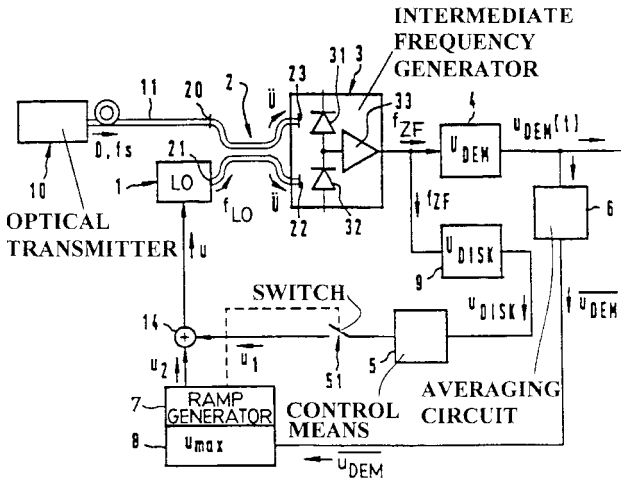
5,510,927 Apr. 23, 1996

Method for Setting the Local Oscillator of an Optical Superheterodyne Receiver

Inventor: Reinhold Noe.
Assignee: Siemens Aktiengesellschaft.
Filed: Sept. 19, 1994.

***Abstract*—**Novel structure and methods for tuning the local oscillator of an optical superheterodyne receiver are disclosed. In a first method, the value of the local oscillator frequency at which the maximum of the chronological average of the output signal from the demodulator occurs is used to set the local oscillator frequency. An alternate method first and second discriminators are used to receive the intermediate frequency signal. The separate discriminator characteristics of the first and second frequency discriminators are used in setting the local oscillator frequency.

10 Claims, 5 Drawing Sheets



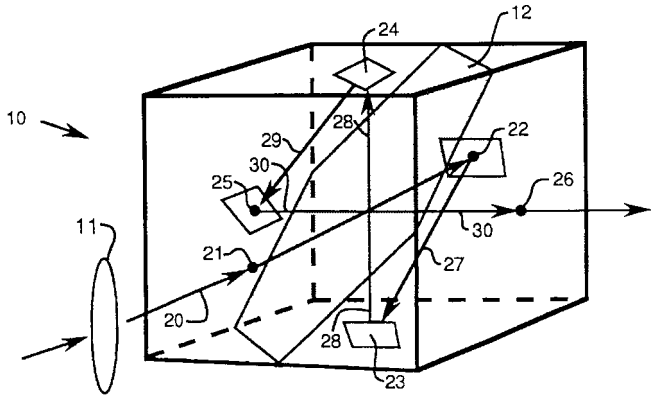
5,510,928 Apr. 23, 1996

Multiple-Pass Optical Filter

Inventor: Patrick J. Hood.
Assignee: Rockwell International Corporation.
Filed: Nov. 7, 1989.

***Abstract*—**A method and apparatus are provided for filtering incident radiation to protect imaging sensors from the damaging effects of high-intensity radiation. The apparatus comprises a filter and a plurality of mirrors disposed within a cube. The filter is positioned diagonally within the cube so that portions of the incident radiation reflected by the filter are directed to a beam-stop on a surface of the cube. Portions of the radiation passed by the filter are directed by the mirrors to pass through the filter a plurality of times. Passing the radiation through a single filter a plurality of times provides a high-density imaging system in a physically compact geometric shape. A focused beam passes through the filter in regions of successively greater optical gain. High-intensity radiation thermally activates the filter to reject the radiation and protect the sensors. Activation of the filter proceeds in stakes starting with the region of the filter receiving the highest optical gain so that the filter is also protected from damaging radiation.

12 Claims, 1 Drawing Sheet



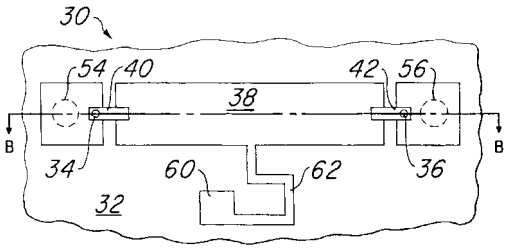
5,511,238 Apr. 23, 1996

Monolithic Microwave Transmitter/Receiver

Inventor: Burhan Bayraktaroglu.
Assignee: Texas Instruments Incorporated.
Filed: June 26, 1987.

***Abstract*—**Preferred embodiments include a microstrip patch antenna (**38**) which also acts as the resonator for an oscillator powered by IMPATT diodes (**34**, **36**); this forms a monolithic transmitter (**30**) for microwave and millimeter-wave frequencies.

16 Claims, 6 Drawing Sheets



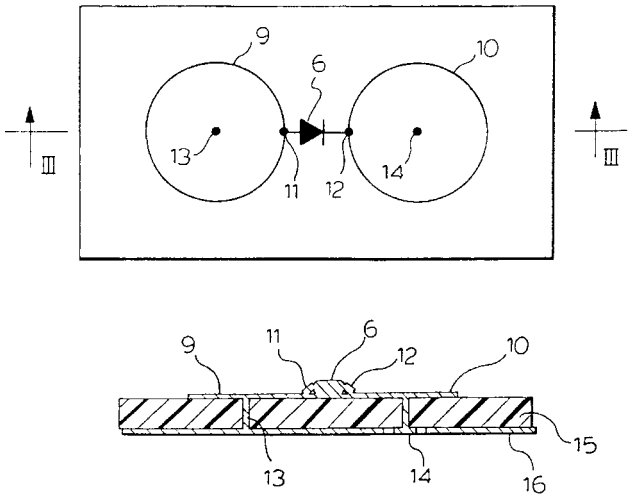
5,512,911 Apr. 30, 1996

Microwave Integrated Tuned Detector

Inventor: Alexandru Oprea.
Assignee: Disys Corporation.
Filed: May 9, 1994.

***Abstract*—**A microwave detector that integrates two circular patch antennas with a detector diode. The high impedance at the edge of the circular patch antenna is combined with 180° out-of-phase electric fields at diametrically opposite points, so as to match to the rf impedance of a zero or small dc bias diode. The result is a very simple, high-sensitivity narrow-band microwave integrated detector.

6 Claims, 2 Drawing Sheets



5,513,283 Apr. 30, 1996

TE-ME Mode Converter on Polymer Waveguide

Inventors: Wol-Yon Whang, Jang-Joo Kim, Tae-Hyoung Zyung, and Min-Chul Oh.
Assignee: Electronics and Telecommunications Research Institute.
Filed: Dec. 8, 1994.

***Abstract*—**A TE-TM mode converter of a polymer electrooptic polarization waveguide type uses the electrooptic birefringence and the electrooptic effect as a nonlinear optical waveguide medium, in which an optical director formed during the poling of a polymer thin film is determined by the direction of the poling electrical field. The poling electrode design enables the optical director having the angle of 45° to the electrical direction of the TE and TM modes to be formed in the polymer thin film. When the waveguide receives the incident light of the TE mode or TM mode, the TE (or TM) mode is switched into the TM (or TE) mode by an effective refraction factor between the optical director and the director perpendicular thereto. If a length of the poling electrode and the birefringence of the waveguide is adjusted, the changes of various electooptic polarization states are possible. The poled thin film has an electrooptic effect. If a voltage is applied to the thin film, the size of the birefringence derived by the poling is changeable. The use of the electrooptic effect enables the outputting state of the waveguide to be maintained at the TE or TM mode by a bias electrode, and if the switching voltage is applied to the waveguide, the TE-TM mode switching can be accomplished.

4 Claims, 3 Drawing Sheets