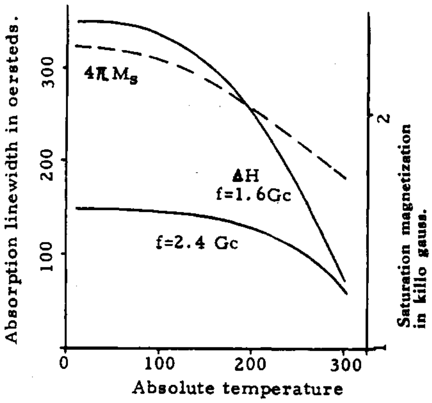

Fig. 2. $4\pi M_s$ and ΔH plotted as a function of absolute temperature in the UHF band.

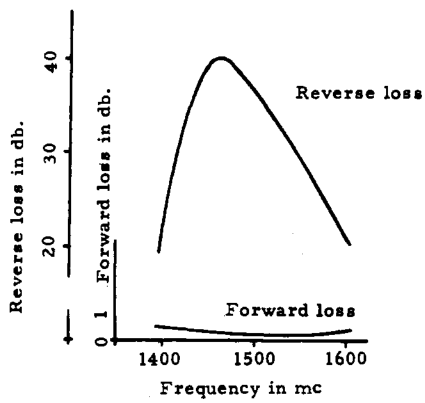

Fig. 3. Tuning characteristics of the strip-line Y-circulator applying the optimum magnetic field to the respective frequency.

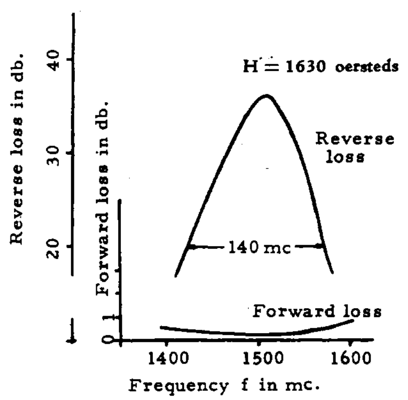

Fig. 4. Frequency characteristic of the strip-line Y-circulator with the constant magnetic field at 4.2°K.

S. Yoshida
K. Kurihara
S. Takahashi
Central Research Lab.
Tokyo Shibaura Electric Co., Ltd.
Kawasaki, Japan

References

[1] L. Davis, Jr., U. Milano, and J. Saunders, "A strip-line L-band compact circulator," *Proc. IRE (Correspondence)*, vol. 48, pp. 115–116, January 1960.

[2] J. A. deGruyl, W. W. Heinz, and S. Okwit, "Helium-cooled Y-junction ferrite circulator switch," *Proc. IEEE (Correspondence)*, vol. 51, p. 947, June 1963; and also M. Uenohara and J. G. Josenhans, "Liquid helium temperature parametric amplifiers," *1964 Internat'l Conf. on Microwaves, Circuit Theory, and Information Theory*, pt. 1, vol. MTO-1.

Corrections

A Limit Upon Laser Amplifier Pump Level

The author is indebted to A. E. Siegman for pointing out an error in the above correspondence.[1]

The reactive elements l_1 and c_1 in the resonant shunt arm which represents the active medium should be negative.[2] Then correcting for another algebraic error, the square of the characteristic impedance should be

$$z_0^2 = \frac{\mu s\left(l, c, s^2 + \frac{c_1}{\sigma_-}s + 1\right)}{l_1 c_1 \epsilon s^3 + \left(\frac{c_1 \ \epsilon}{\sigma_-} + c_1 l_1 \sigma_+\right)s^2 + \left[\epsilon + \left(\frac{\sigma_+}{\sigma_-} - 1\right)c_1\right]s + \sigma_+}. \tag{1}$$

Also l_1 and c_1 should be related to line width $\Delta\omega$ and center frequency ω_0 by

$$l_1 = \frac{1}{\Delta\omega\sigma_-} \text{ and } c_1 = \frac{\Delta\omega\sigma_-}{\omega_0^2} \qquad \text{(2a,b)}$$

so using the notation that $\tau_d = \epsilon/\sigma_+$

$$z_0^2 = \left(\frac{\mu}{\epsilon}\right)\frac{s(s^2 + \Delta\omega s + \omega_0^2)}{s^3 + (\Delta\omega + 1_d\tau_d)s^2 + \omega_0^2\left[1 + \frac{\Delta\omega}{\omega_0^2\tau_d}\left(1 - \frac{\sigma_-}{\sigma_+}\right)\right] + \frac{\omega_0^2}{\tau_d}}. \tag{3}$$

For $\Delta\omega\tau d \gg 1$ this expression has two right-half plane poles and therefore absolutely unstable propagat on if

$$\left(\frac{\sigma_-}{\sigma_+} - 1\right) > \frac{\omega_0^2\tau_d}{\Delta\omega} \tag{4}$$

while for $\Delta\omega\tau d \ll 1$ there is absolutely unstable propagat on if

$$\left(\frac{\sigma_-}{\sigma_+} - 1\right) > (\omega_0\tau_d). \tag{5}$$

A. C. Scott
Dept. of Elec. Engrg.
University of Wisconsin
Madison, Wis.

Manuscript received August 5, 1965.

[1] A. C. Scott, *Proc. IEEE*, vol. 53, p. 537, May 1965.

[2] R. L. Kyhl, "Negative L and C in solid-state masers," *Proc. IRE (Correspondence)*, vol. 48, p. 1157, June 1960.

On the Terminal Description of Nonlinear Networks

The author of the above correspondence[1] wishes to change the theorem it contains to a *conjecture*; the indicated proof is incorrect because an additivity assumption is implied in applying $y_a[\ \ ]$ to v of (3). Proofs for special cases are on hand, but no general one has yet been found; still the result appears true, and the general description remains available where applicable. The author hopes that the change presents a challenge to those interested, in place of an inconvenience.

R. W. Newcomb
Stanford Electronics Labs.
Stanford, Calif.

Manuscript received September 21, 1965.

[1] R. W. Newcomb, *Proc. IEEE*, vol. 53, pp. 1149–1150, August 1965.

Some Invariant Properties of the Polarization Scattering Matrix

The following typographical errors occurred in the above short paper,[1] which appeared in the August 1965 issue of the Proceedings of the IEEE.

In equation (12) the minus sign should be in the lower left-hand corner of the matrix.

The fourth line of the section on circular polarization should read, "Setting $\alpha = \pi/4$ in (25) through (27)."

The author would like to thank E. Brookner for pointing out the first error.

S. H. Bickel
The MITRE Corp.
Bedford, Mass.

Manuscript received September 27, 1965.

[1] S. H. Bickel, *Proc. IEEE*, vol. 53, pp. 1070–1072, August 1965.

A Parametric Converter Using Nonlinear Resistance and Reactance

In the above correspondence[1] equation (20) gives the conditions for unidirectional high gain for the special case of $g_2 = 0$. These conditions and also those for $g_2 \neq 0$ are very difficult, if not impossible, to meet using a non-negative conductance. A more satisfactory unidirectional, high gain converter may be obtained by changing the present output frequency to $\omega_q - 3\omega_p$.

D. P. Howson
Dept. of Electronic and Elec. Engrg.
University of Birmingham
Birmingham, England

Manuscript received October 6, 1965.

[1] D. P. Howson, *Proc. IEEE*, vol. 53, pp. 1228–1229, September 1965.