Lumped approximation to distributed RC notch networks for linear integrated circuits. S. M. BOZIC, C. A. MILLER and R. I. SALAWU. *Microelectron. & Reliab.* **11** (1972), p. 191. Handling of the transcedental equations arising in distributed networks is rather cumbersome. Therefore, in this paper, a lumped approximation to the RC network has been examined. Generalized expressions have been derived for the open circuit voltage transfer function valid for n-lumped sections. This is a rational polynomial and as such easier to handle for analytical purposes. Application has been made to the cases of $n = 2$ to seven sections and the results obtained have been compared with the ones from exact analysis of the RC notch network. Root-locus graphs have also been derived and plotted for three and seven sections.

An automated integrated circuit layout design program of a systematic chip using building blocks. N. SUGIYAMA and M. HIRANO. *Abstracts Trans. Inst. Electron. Commun. Engrs. Japan* **55**, No. 1 (1972), p. 15. This paper deals with the LSI layout design program of a chip using building blocks. On the basis of design specifications, the external terminals and buffers are placed in the external region of chip. The block layout and interconnections are made so as to minimize the chip area, permitting the output equipment to draw an enlarged pattern.

The self-registered MOSFET—a brief review. D. M. BROWN. *Solid St. Technol.*, April (1972), p. 33. The advantages of self-registered MOSFET's are discussed and the basic methods of producing MOSFET's and MOSFET integrated circuits with self-aligning gate electrodes are briefly reviewed.

Graphic analysis and design of MOSFET astable multivibrators. M. KOTANI. *Trans. Inst. Electron., Commun. Engrs. Japan* **55C**, No. 3 (1972), p. 149. (In Japanese.) In a MOSFET astable multivibrator, the voltages V_{c1} and V_{c2} across the coupling condensers are taken as a parameter, and the voltage gain curves of the two MOSFETs are drawn on the coordinates of the gate voltages V_{g1} and V_{g2}. Because a waveform of the drains and gates can be derived from this new diagram easily, analysis and design of MOSFET astable multivibrators are done using the diagram.

Déphaseurs microélectronique en bande X et KU. C. JOUSSEMET. *Rev. Tech. Thomson-CSF* **4**, No. 2 (1972), p. 407. (In French.) The circuits discussed are three-bit reflection digital phase-shifters operating in X- and KU-band and employing PIN diodes. After giving a theoretical exposition about perturbance transmission phase-shifters and reflection-type 0–180 degrees phase-shifters, the author shows how such phase-shifters can be constructed in the hybrid integrated microcircuit technique and then gives the results obtained with such devices, showing that they are compatible with electronic-scan antennas and should soon make it possible for the latter to be used in multiple-function airborne radars.

Interfacing with MOS circuits. M. R. MCCANN. *Microelectronics* 1972 **4**, No. 2 (1972), p. 2. Interfacing circuits can be designed to operate between bipolar integrated circuits and all forms of MOS circuitry. They are simpler with the lastest MOS circuitry having a low threshold voltage and when one or more supply voltages are +5 V. Exact choice of the interface circuit depends upon the degree of noise immunity needed, the internal characteristics of the MOS circuit and what complexity of circuit can be afforded.

BIGFET makes IGFET more versatile. G. T. CHENEY and G. MARR. *Bell Labs Rec.*, June–July (1972), p. 195. Compatibility between various integrated logic forms is a consistent goal of designers of integrated circuits. The bipolar-IGFET structure combines the low output impedance of a bipolar transistor and the high input impedance of an IGFET on the same circuit.

Processing of emulsion photomasks for semiconductor applications. K. G. CLARK. *Solid St. Technol.*, June (1972), p. 29. Semiconductor device technology has advanced rapidly over the past five years in the fields of discrete devices, integrated circuits and the larger wafer sizes upon which these semiconductors are produced. This has had the resultant effect that photomask making has undergone ever changing requirements for the element dimensions, circuit sizes and overall mask sizes, with new equipment for the improved emulsion processing technologies. High resolution photomask requirements for element dimensions, die sizes, die placement accuracy, and allowable defect levels are discussed. The characteristics of Kodak High Resolution Plates, Type 2 and Agfa Micron Photoplates, and their processing are reviewed. Negative and positive working processes, are described, for producing accurately defined 1–10 μm geometries of high contrast (density above gross fog of greater than 2·0) and clear areas retaining the minimal residual silver. Photo-emulsion plate processing is evaluated to give minimal defect areas thus allowing large scale integrated circuits, up to 5 × 5 mm in size, to be produced at high yield. A comparison of applications in high resolution processing is made, highlighting the extreme care taken in emulsion photoplate processing for semiconductor applications.

Keramische substrate fur Mikro-Schaltkreise. F. SAURE and A. RECKZIEGEL. *Radio Ment. Electron.* **9** (1972), p. 422. (In German.) Ceramic substrates for thick and thin film circuits. Alumina may be used for both technologies but with different surface properties. The thermal conductivity of alumina is quite sufficient. The table shows that BeO is better by a factor of 10 in the thermal conductivity but BeO is very expensive and therefore used only in special cases. Production techniques, surface properties and specifications of alumina substrates for thick and thin film circuits and for microwave use are discussed.

Planar multi-layer interconnect structure. H. TSUNEMITSU and H. SHIBA. *NEC Res. Dev. Japan,*