SESSION 12: COMMUNICATIONS FILTERS

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The papers in this session cover practical realizations of filters and multiplexers for use in the satellite communications frequency bands. Advances in performance (especially loss) and configuration (size and weight) are represented. Consistent improvements in these areas can be expected as more demands are made for higher performance communications satellites.

In the first paper, **"Engine-Block" Dual Mode Dielectric Resonator Loaded Cavity Filter with Nonadjacent Cavity Couplings** by S.J. Fiedziuszko, a 4 Ghz eight-resonator filter is described which combines the "engine block" configuration with dielectric loading of dual-mode cavities. The result is a high performance filter which is easier to tune and physically integrate into a system.

The next paper is **Narrow Bandpass Filters using the High Q Cylindrical TE0m1 Resonator Modes** by R.R. Bonetti and A.E. Williams. The realization of optimum response, narrow bandpass filters using the TE021 circular waveguide mode is described. An unloaded Q of 25,000 was achieved in a four-resonator elliptic function filter at 17.5 Ghz.

In **Predistortion Techniques for Multiple-Coupled Resonator Filters** by A.E. Williams, W.G. Bush and R.R. Bonetti, a technique is presented for the design of narrow band filters and/or filters using resonators with relatively low unloaded Q. The result is improved flatness of the passband loss for general filters with finite loss poles in the stopband. This technique can be applied when higher passband loss is tolerable.

New types of waveguide lowpass filters are described in **Novel Lowpass Harmonic Filters for Satellite Application** by A.M.K. Saad. These filters use ridged waveguide sructures. Finite stopband loss poles can be included in the response for improved selectivity. Low passband loss, broad spurious-free stopbands, and high power capability have been achieved in practical designs for the 4 Ghz and 12 Ghz satellite communications bands.

Practical solutions have been achieved for what has been one of the most difficult problems in multiplexer design. These results are presented in the final two papers, **A 12 Ghz 12 Channel Contiguous Multiplexer for Satellite Applications** by S.C. Holme, and **A 12-Channel Contiguous Band Multiplexer for Satellite Application** by R. Tong and D. Smith. Both multiplexers use 6-pole dual-mode quasi-elliptic filters based on singly-terminated prototypes.

These multiplexers were designed with data obtained from computer programs, with good agreement between computed and measured performance. It is very significant that in both instances no adjustments were made to the calculated manifold spacings. Evidently only relatively minor adjustments were needed on the individual filters once they were mounted on the manifolds. Interaction effects and other problems associated with the manifold have been effectively minimized.