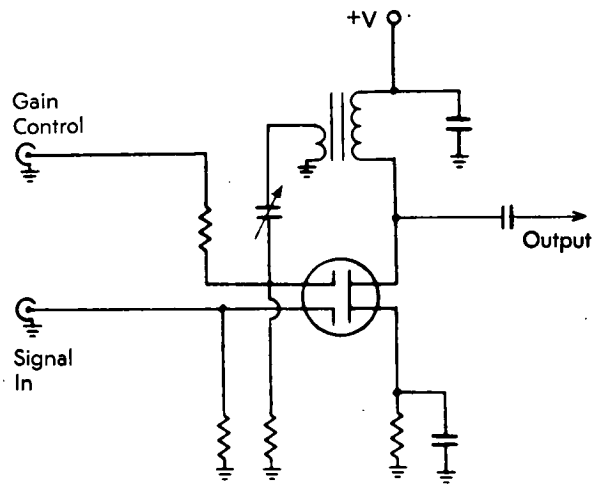
NASA TECH BRIEF

NASA Pasadena Office

Low Phase-Shift Amplifier

The problem:

To decrease the phase shift which occurs in the output of an amplifier when the automatic gain control (AGC) is changed.



The solution:

Use a broadband transformer to neutralize the distributed capacity between the drain and control gate of a dual-gate MOSFET.

How it's done:

The single-stage MOSFET amplifier shown in the diagram is identical to a standard neutralized amplifier except that the neutralization provided by a broadband transformer is applied to the AGC gate instead of the signal gate; this arrangement cancels effects attributable to the capacitance existing between the control gate and the drain.

There is an RC network which consists of the drain-to-control-gate capacity and the channel resistance. The channel resistance varies with a change of voltage on the control gate and causes the RC time constant to change; as a result, there is a change of phase from input to output of the amplifier. Neutralization of the drain-to-control-gate capacity minimizes the phase change induced by variation in AGC.

The amount of phase shift *vs* gain in a three-stage amplifier was found to be $\pm 0.3°$ for a gain change from 10 dB to 50 dB. The amplifier will handle signal levels up to about one volts rms. The noise figure is about 9 dB at 10 MHz when driven from a 1000-ohm source.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
NASA Pasadena Office
4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP72-10185

Patent status:

NASA has decided not to apply for a patent.

Source: George F. Lutes and
Richard C. Coffin of
Caltech/JPL
under contract to
NASA Pasadena Office
(NPO-11663)

Category 01