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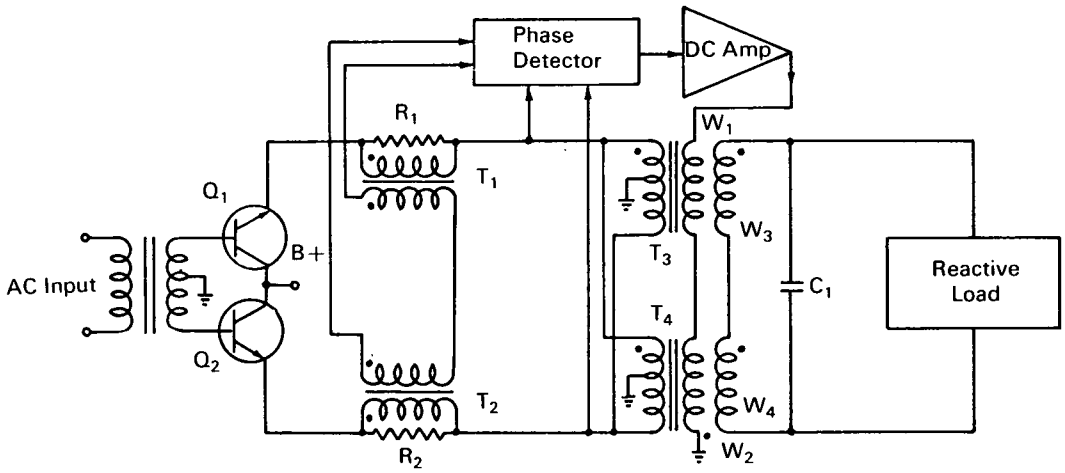
Brief 66-10431

# NASA TECH BRIEF



## Control Circuit Maintains Unity Power Factor of Reactive Load




### The problem:

To maintain power supply efficiency where negative load reactance changes and varies. Previous techniques inserted an inductor into the circuit if the load was highly capacitive, or a capacitor if the load was highly inductive. Should the load reactance change, it would then be necessary to change the value of inductance or capacitance inserted into the load circuit. It is required that a reactance equal to the load negative reactance be maintained in the load circuit for minimum current to produce the desired output power for the load.

### The solution:

A circuit including feedback control elements for automatically correcting the power factor of a reactive load. The circuit maintains unity power factor by providing corrective error signals to the control windings of a power supply transformer.

### How it's done:

Current supplied by $Q_1$ and $Q_2$ which, in effect, is the current through $R_1$ and $R_2$, is sampled by $T_1$ and $T_2$, respectively, and fed as one input to the phase detector. The other input to the phase detector is the voltage across the parallel connected primary windings of $T_3$ and $T_4$. Since $T_3$ and $T_4$ are driven push-pull, the current is sampled on both sides. The phase detector generates an error signal proportional to the angular difference between the voltage and current sampled. The error signal is amplified by the dc amplifier, and a control current developed in windings $W_1$ and $W_2$. The control current adjusts the self-inductance to drive the phase angle between the sampled voltage and current to zero. Because the control winding only reduces the self-inductance of the transformers, $C_1$, connected across the series-connected secondary windings $W_3$ and $W_4$ of $T_3$ and $T_4$, is chosen so that the leading current, due to $C_1$ alone, will be

(continued overleaf)

greater than the maximum lagging current that would result from an inductive reactive load.

**Notes:**

1. This circuitry will give continuous automatic power factor correction to power supply systems having a reactive load.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas, 77058
   Reference: B66-10431

**Patent status:**

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: Manuel Kramer and Louis H. Martinage
of International Business Machines
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