NASA TECH BRIEF

Lewis Research Center

SIGNAL CONDITIONER FOR POTENTIOMETER TYPE TRANSDUCERS

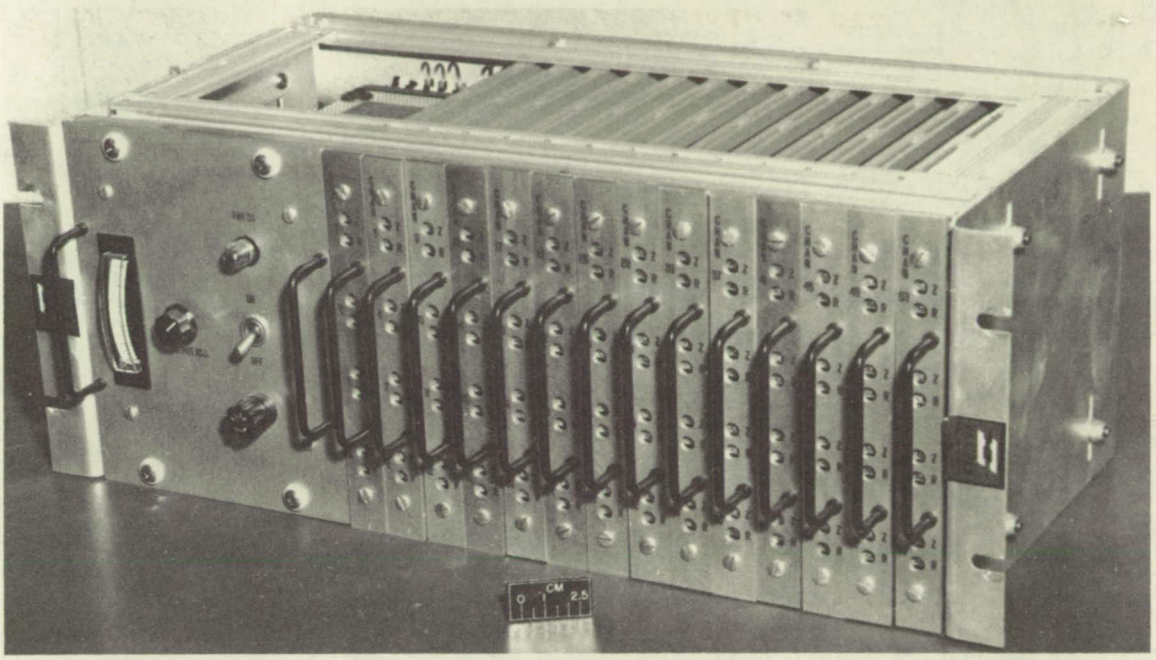

FIGURE 1

The Problem:

The method employed in most test cells for signal conditioning of pot-type transducers is individual adaptation of available parts assembled by a technician when the need for such a conditioner arises. It usually occupies considerable panel space and/or is so located that two technicians are required to adjust and read the meter or chart.

Two commercial signal conditioners are available. One is a 20 channel conditioner which is merely a regulated power supply. The zero and span adjustments must be added to the transducer as options. The cost per channel for this 20-channel conditioner is approximately $80. This conditioner does not provide the convenience and necessity of adjustment from the control room. The other commercial signal conditioner is a strain-gage type signal conditioner which costs approximately $125. per channel.

The Solution:

A pot-type signal conditioner utilizing printed circuitry which fits into a standard 17.8 cm (7 inch) by 48.3 cm (19 inch) rack, accomodates 56 channels, can be operated by one attendant, and costs approximately $45. per channel (see Figure 1).

How It's Done:

The pressure transducer used in this system employs a capsule or a bourdon tube as the sensing element. Figure 2 is a schematic diagram. A frictionless lever system amplifies the motion of the sensing elements and operates a contact wiper over a potentiometer, thus the resistance change is proportional to the input pressure change. An external power supply, considered part of the signal conditioner, provides a dc voltage across the potentiometer. The output from the wiper is fed into a high impedance readout device.

(continued overleaf)

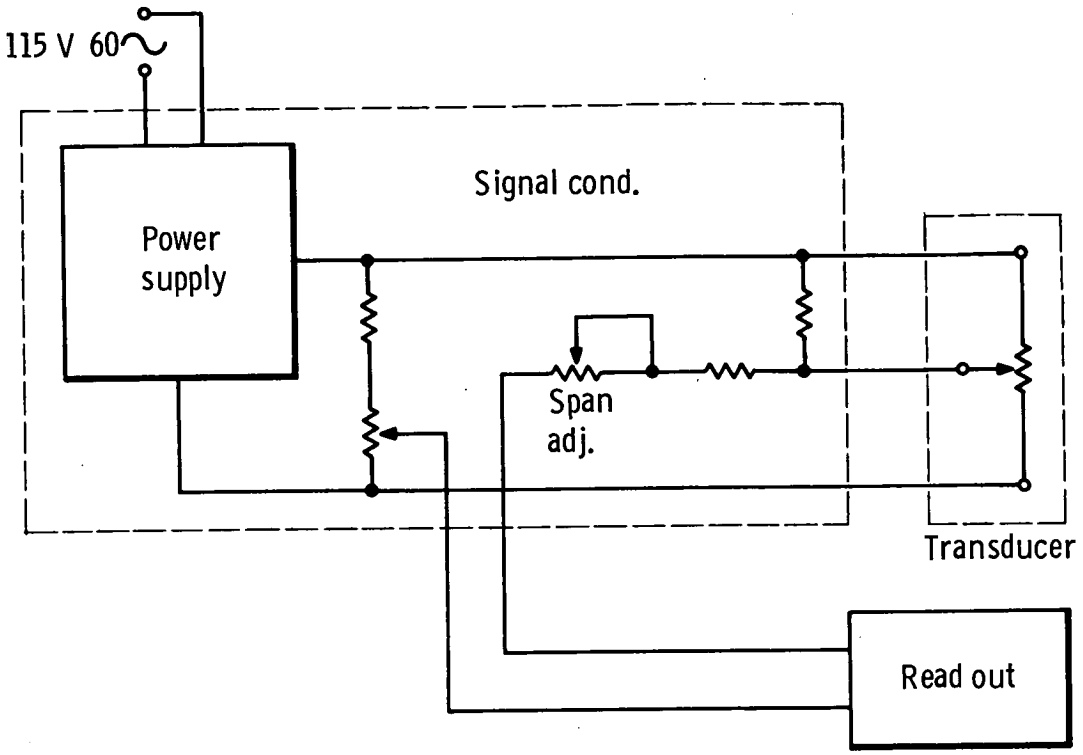

Figure 2

In order to provide some adjustment of the zero reading and full scale or span, the transducer may be purchased with a span pot and zero bypass wiring. Locating the adjustment on the transducer itself is not always the most convenient location, however. Locating it back on the power supply converts the power supply into a single channel signal conditioner, as is done in this unit. In addition, current limiting resistors are added to improve the overall readout accuracy. The pot-type transducer normally has a resistance of only 1000 ohms, so that there is some current flow which creates an inaccuracy, but this type transducer may be used when a 1-2% readout is adequate.

The design of this unit not only provides conveniences and ease of operation, but the cost per channel is one-third to one-half that of commercially available equipment.

Note:

Additional documentation may be obtained from:

Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B73-10015

Patent Status:

NASA has decided not to apply for a patent.

Source: E.C. Armentrout and E. Gross
Lewis Research Center
(LEW-11822)