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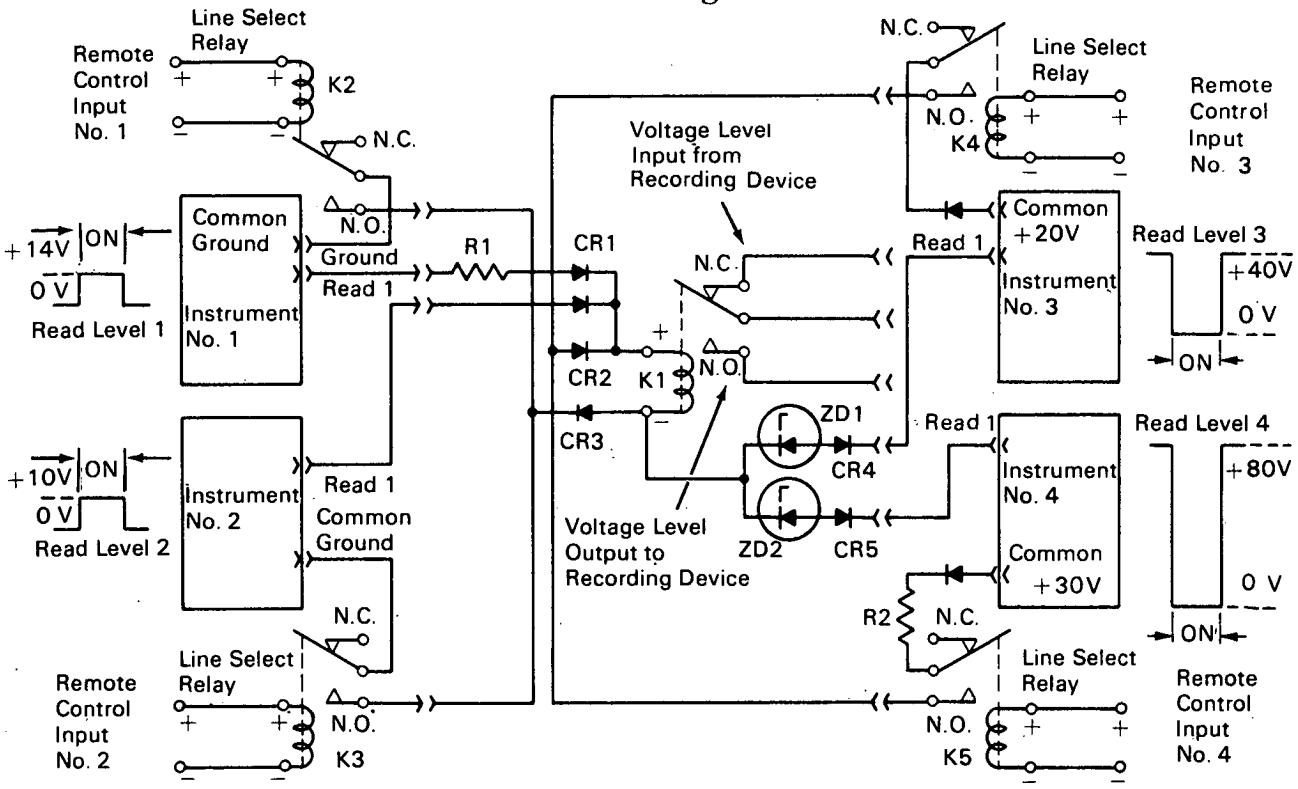
# NASA TECH BRIEF

*Marshall Space Flight Center*



## Universal Interface Enables One Recorder to Serve Numerous Measuring Instruments




An interface circuit transfers data from several measuring instruments to a common recording device. Data can be handled regardless of polarity and amplitude, in 10-line decimal form or in any form of binary coded decimal.

The basic circuit described here has parallel inputs to K1 from 4 separate instruments. Additional instruments may be added by expanding the basic circuitry. The circuits for instruments 1 and 2 are designed to operate around the nominal +10V Read Level of instrument 2; therefore, an attenuator, R1, is added in series with the contact of K2. Line select relays K2, K3, K4, and K5 are remotely controlled and can select the instrument to be connected to the recording device. As instrument 1 is selected, relay K2 is energized, closing the common ground loop to instrument 1. Relay K1 remains open as "Read 1" output is off (0 volts). When "Read 1" level for instrument 1 turns on, current flows through R1, CR1, the coil of K1 (energizing

(continued overleaf)

it), and CR3, back through the normally open and the wiper contacts of K2 to instrument 1 common. As the recording device places a voltage level on the wiper of K1, it will be routed through its normally open contact back to the "Read 1" input of the recording device. If instruments 3 and 4 "Read 1" levels are OFF, CR4 is back-biased by +40V and CR5 by +80V. Should instruments 3 and/or 4 exhibit "Read 1" with an ON condition simultaneously with instrument 1, as K1 remains energized, back-bias is removed from CR4 and/or CR5 and they are at 0 volts. When instruments have common chassis grounds, Zener diodes ZD1 and/or ZD2 prevent low-leak circulating currents from unbalancing the circuit.

Tracing around another loop and starting with all conditions OFF, assume K4 is now energized and instrument 3 "Read 1" is ON (0 volts). The common +20Vdc is applied to the circuit, the +40Vdc drops to zero, back bias is removed from the cathode of CR4, and current flows. Current flows through the contacts of K4, CR2, the coil of K1 (energizing it), ZD1, CR4, and back to instrument 3. This causes K1 to route the information to the recording device. The circuits for instruments 3 and 4 are designed to operate around the nominal +20Vdc common of instrument 3; therefore, an attenuator, R2, is added in series with the contacts of K5. Otherwise, the circuits operate in the same manner.

All ON or OFF conditions remain for the duration of an instrument reading and do not change until the instrument takes another reading. The waveforms shown beside each instrument indicate amplitude and polarity of the "Read" levels being transmitted between the instrument and the interface.

## Note:

Requests for further information may be directed to:

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Code A&TS-TU
Huntsville, Alabama 35812
Reference: B71-10011

## Patent status:

No patent action is contemplated by NASA.

Source: Noel E. Donlin of
The Boeing Company
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