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BENDIX SYSTEMS DIVISION ANN ARBOR, MICH.

Packing of Central Station Event
Measurements

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This memo recommends that 4 or 5 central station events be packed into a single analog channel and shows a simple method for doing this.

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Several central station on / off events are required for telemetry. By assigning a channel of the analog multiplexer to each such event, one bit of information is transmitted per channel. This represents only a 10% efficiency and is therefore wasteful of telemetry channels.

Five of these events are especially simple being the positions of the five experiments on/off switches (off assertion). Whenever an experiment is off, 29 volts are applied to the off terminal of that relay. It is suggested that at least four of these events be packed into a single analog channel.

One relatively simple method to achieve this is to perform a crude digital to analog conversion by placing a voltage divider on each off-terminal designed so as to produce 2500, 625, 156, and 39 millivots, that is 1/2, 1/8, 1/32, and 1/128 of 5 volts, respectively for experiments 1, 2, 3 and 4. If these were then summed on a resistor and the result placed in a channel of the multiplexer then the digital output from the AID converter would have the following bit pattern if all experiments were off:

0010101010

Turning on experiment #1 would remove the 1/2 voltage leaving 1/8 + 1/32 + 1/64 which changes the 2⁷ bit to 0 leaving the others unchanged. Similarly, the 2⁵ bit mimics the #2 switch, etc.

For 5 experiments the choice could be 1/2 1/4 1/16 1/64 and 1/256 of 5 volts or 2500, 1250, 312, 78 and 20 millivots for experiments #1, 2, 3, 4, and 5 respectively giving an "all-off" bit pattern of

0011010101

The number of switches which can be packed into a single channel should be determined according to the accuracy with which the voltage division and summation can be performed so as to give no ambiguity in the bit pattern.