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A SCALER PRINTOUT SYSTEM†

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Several scaler printout systems have been described in the literature, and others are available commercially.[1] The system described here is capable of printing data from up to fourteen 7-decade scalers onto 3-in.-wide paper tape in less than 3 seconds. It is composed of commercial scalers,[2] a commercial digital recorder,[3] and a digital data scanner. (See Fig. 1.) A typical printout is shown in Fig. 2.

The Digital Data Scanner is a digital multiplexing and control device interfacing the scalers to the digital recorder. It utilizes silicon semiconductors exclusively and is constructed on plug-in cards.[4] The unit measures 7 in. high, 19 in. wide, and 15 in. deep.

OPERATION

A typical signal path is shown in Fig. 3, and a block diagram of the Digital Data Scanner in Fig. 4. Each scaler output buffer stage consists of a germanium PNP transistor, which is saturated for an output of 0V or is cut off for an output of -10V. The diode multiplexer gates in the scanner select which one of the 14 data input channels is to be printed by the recorder; in Fig. 3 this is Channel 1, corresponding to the quiescent condition.

The multiplexer gates are sequentially selected by the Channel Counter via a decoder and gate drivers. The Channel Counter is a four flip-flop

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binary counter, which is incremented by a Scan signal returning from the recorder after each line is printed. The number of channels to be printed is selected by a front panel thumbwheel switch. When this number is reached, the Channel Counter is reset and the printout is terminated after a blank line is printed.

A front view of the Digital Data Scanner is shown in Fig. 5. Three thumbwheel switches select an identification code which is printed on each line of data.[5] The Test toggle switch selects the test code supplied to a rear panel test connector for the purpose of testing the fourteen input channels and interconnecting multiconductor cables. The Mode switch selects one of the three operating modes: In the External Mode the recorder prints one set of data for each pulse received at the External Print input; in the Manual Scan Mode the recorder prints one set of data for each operation of the Print pushbutton; in the Single Mode the scanner advances one channel and the recorder prints one line (one scaler) for each operation of the Print pushbutton. Depressing the Reset pushbutton-indicator resets the Channel Counter to Channel 1, and the indicator light indicates the reset state.

A rear view of the scanner is shown in Fig. 6. The I.D.OUT and the I.D.IN connectors are interconnected by a multiconductor cable, unless it is desired to enter external identification information. The Inhibit outputs provide external control signals during printout.

Provision is made to initiate printouts after a preset number of counts have been accumulated in scaler No. 1. This feature is utilized in the setup shown in Fig. 7, as used in an experiment.

ACKNOWLEDGEMENT

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FOOTNOTES

1. F. Iselin, Nucl. Instr. and Methods 20 (1963) 330-335, describes a system which prints data from up to thirty 25 Mc/sec, 6-decade scalers on a Hewlett-Packard recorder operating at a rate of 4 scalers per second. H. G. Jackson, L. B. Robinson, and D. L. Wieber, Nucl. Instr. and Methods 30 (1964) 261-267, describe a system which prints data from 10 Mc/sec, 6-decade scalers on an IBM Selectric typewriter at a rate of approximately 2 scalers per second. The TSI Model 1520 Digital Scanner prints data from up to sixteen TSI 7-decade Pulse Counters on an IBM Model B typewriter at a rate of approximately one scaler per second.
2. Model 1511A Dual Pulse Counter, Transistor Specialties Inc. (TSI), Plainview, New York. This instrument consists of two independent 7-decade scalers, each capable of a 10 Mc/sec counting rate, and provides both visual display and parallel electrical readout on rear panel multipin connectors.
3. Model 562AR Digital Recorder, Hewlett-Packard Co., Palo Alto, California. The solid-state unit accepts the 1-2-4-8 Binary Coded Decimal (BCD) outputs of the scalers and is capable of printing a line of 12 alphanumeric characters at a rate of 5 lines per second.
4. The majority of the plug-in cards, the chassis, and the power supply are products of Scientific Data Systems, Santa Monica, California.
5. This code consists of the digits 0 to 9, blank, and a minus sign.

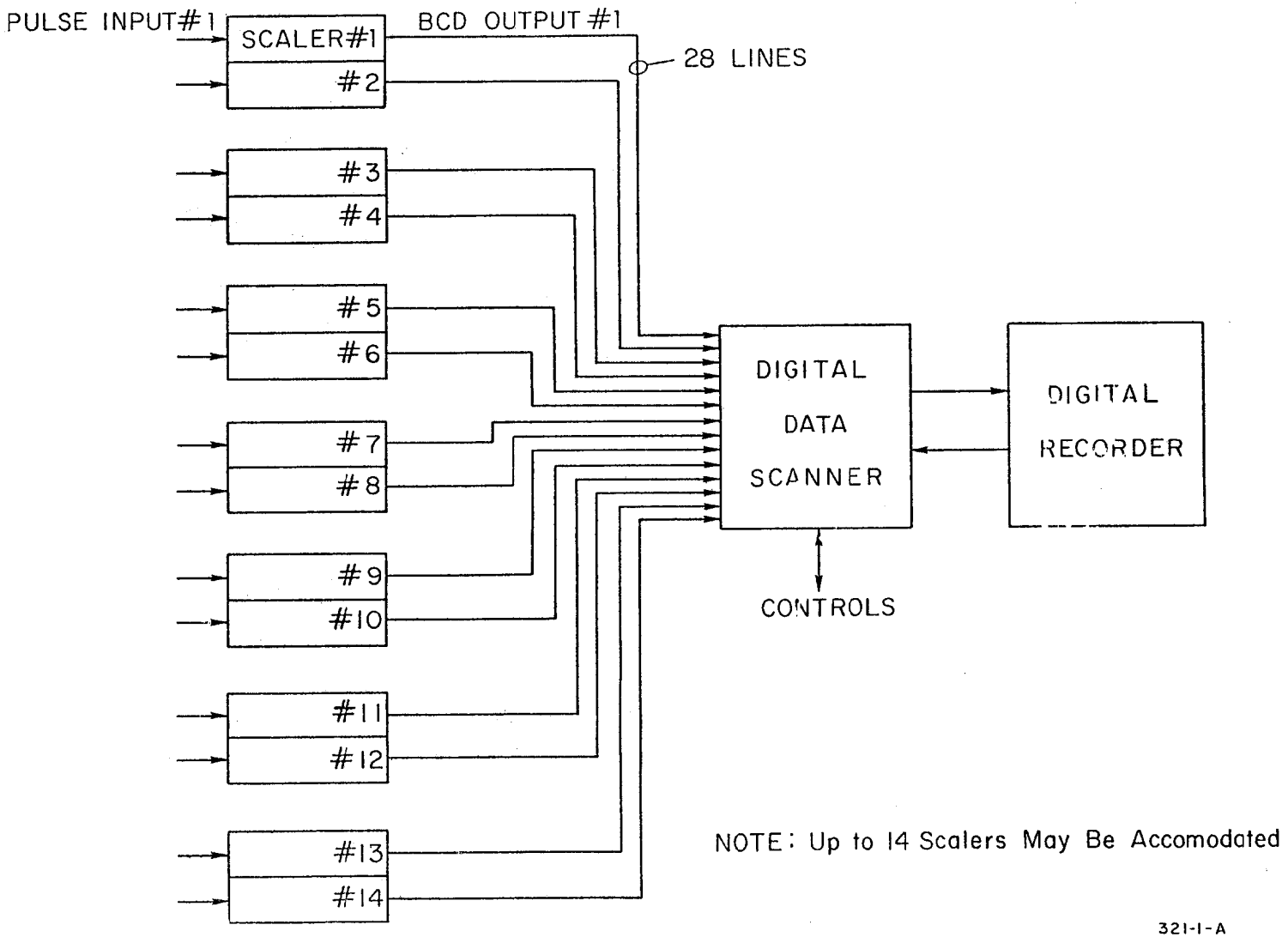

Fig.1 SCALER PRINTOUT SYSTEM-BLOCK DIAGRAM

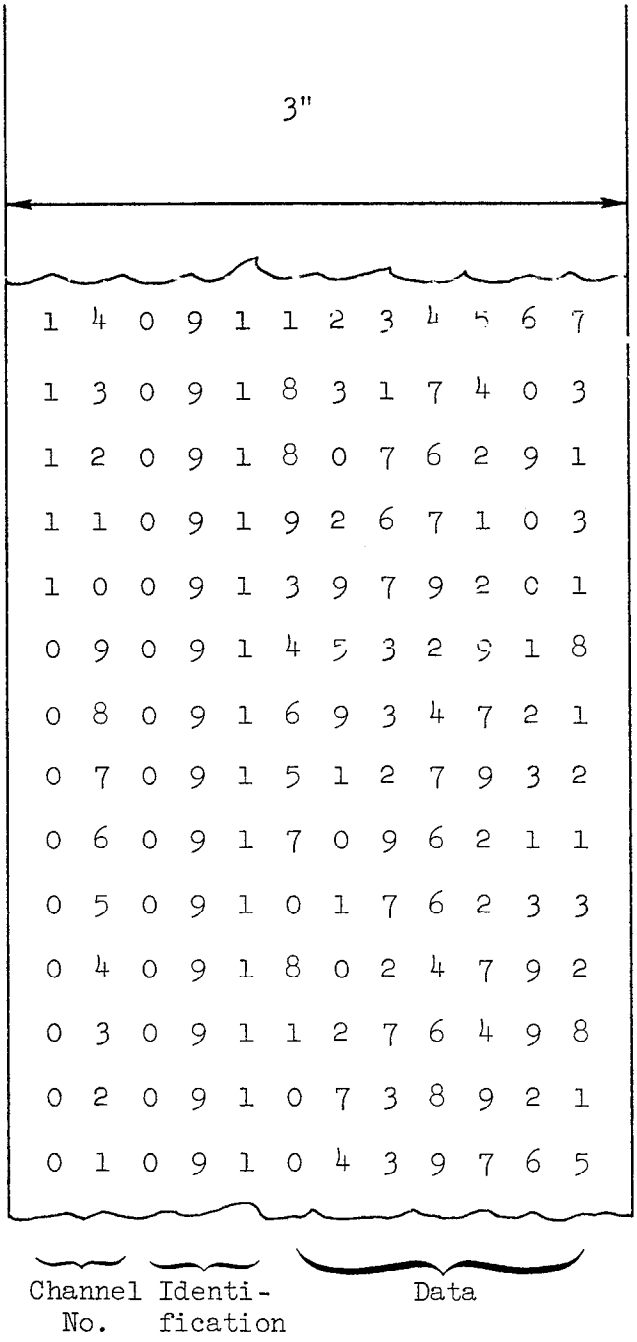

FIG. 2--Typical printout

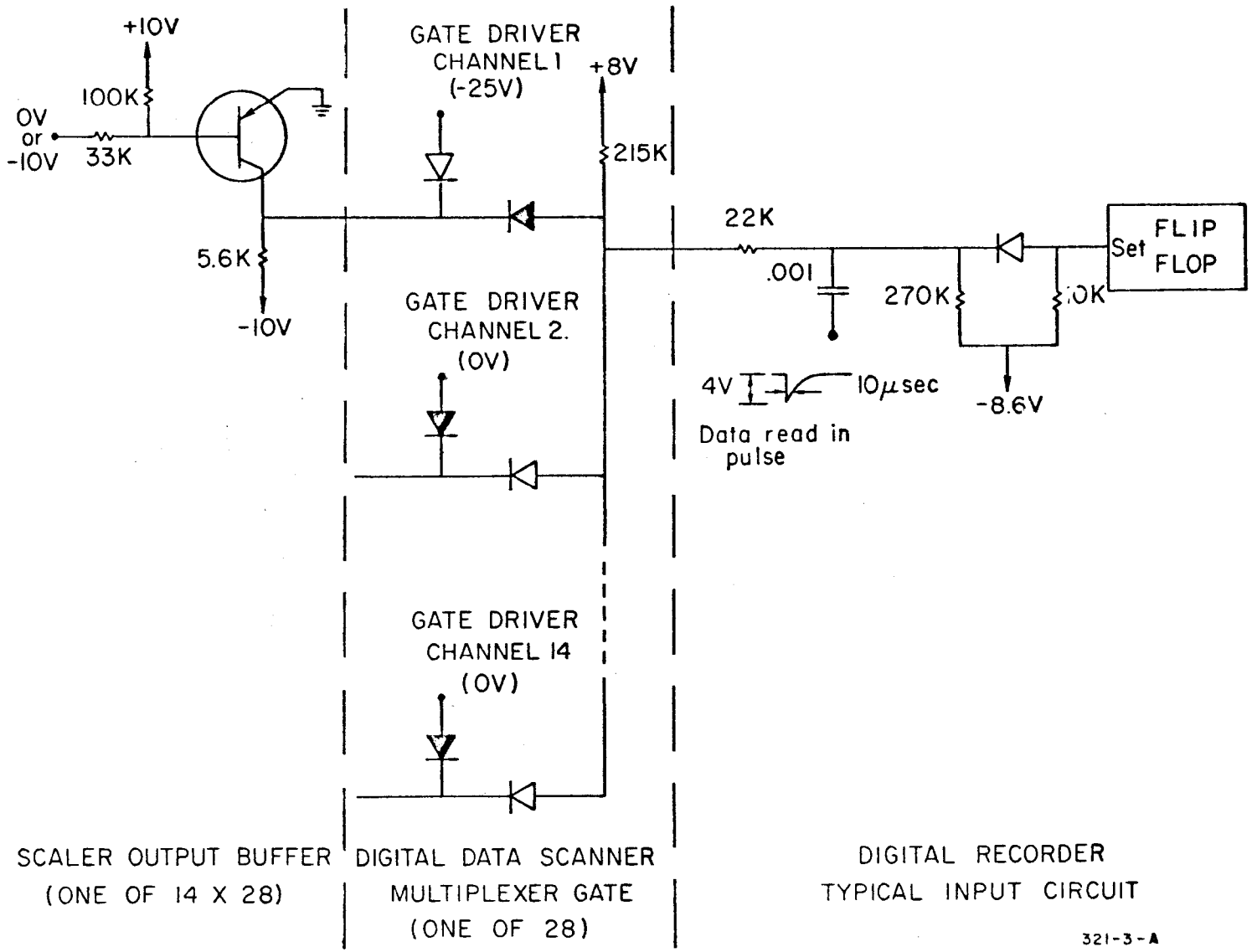
+10V
100K
0V
or
-10V
33K
5.6K
-10V
GATE DRIVER
CHANNEL 1
(-25V)
GATE DRIVER
CHANNEL 2.
(0V)
GATE DRIVER
CHANNEL 14
(0V)
+8V
215K
22K
.001
270K
10K
Set
FLIP
FLOP
4V
10μsec
Data read in
pulse
-8.6V
SCALER OUTPUT BUFFER
(ONE OF 14 X 28)
DIGITAL DATA SCANNER
MULTIPLEXER GATE
(ONE OF 28)
DIGITAL RECORDER
TYPICAL INPUT CIRCUIT
321-3-A

Fig. 3

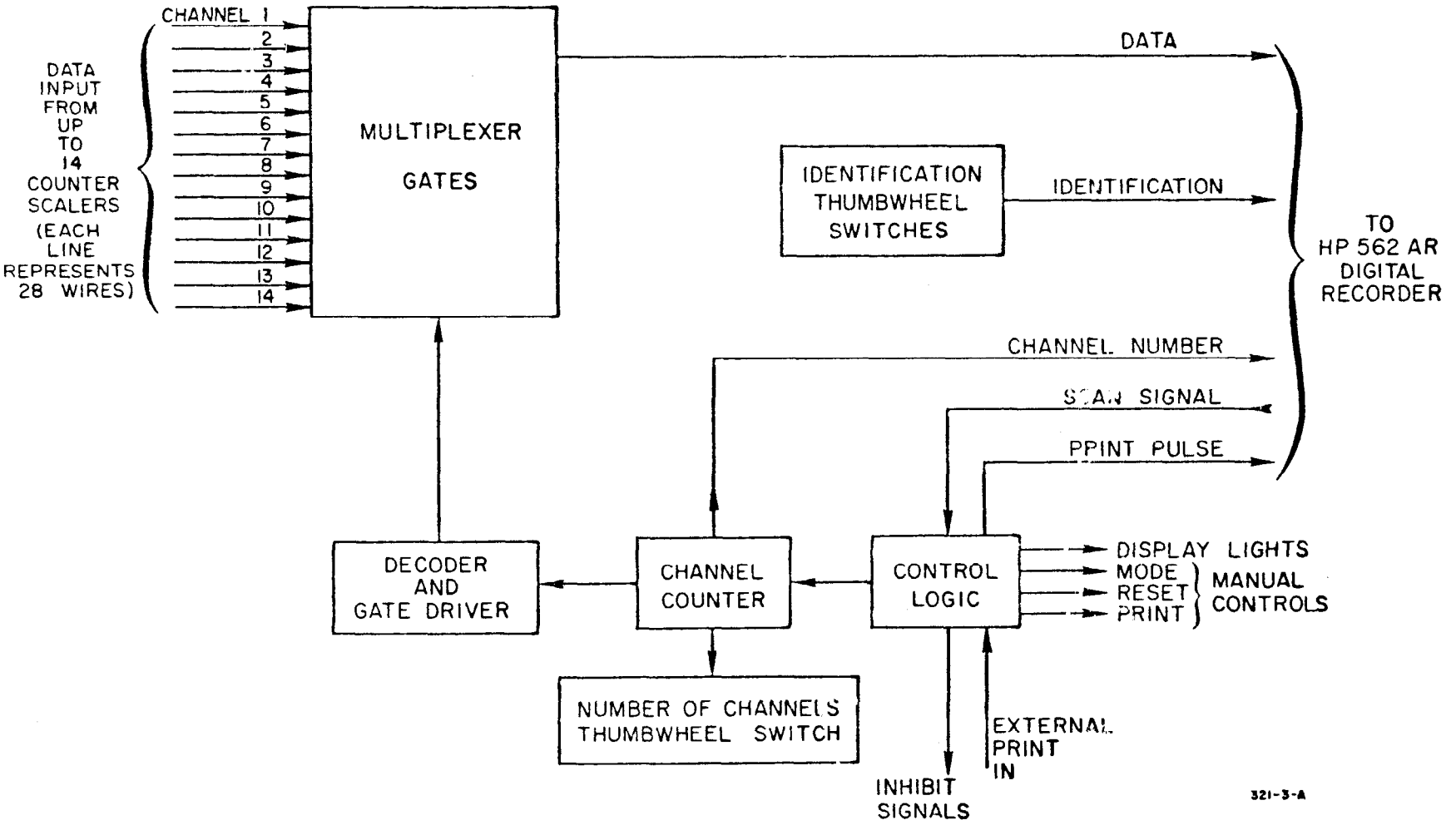

FIG. 4

DIGITAL DATA SCANNER

BLOCK DIAGRAM

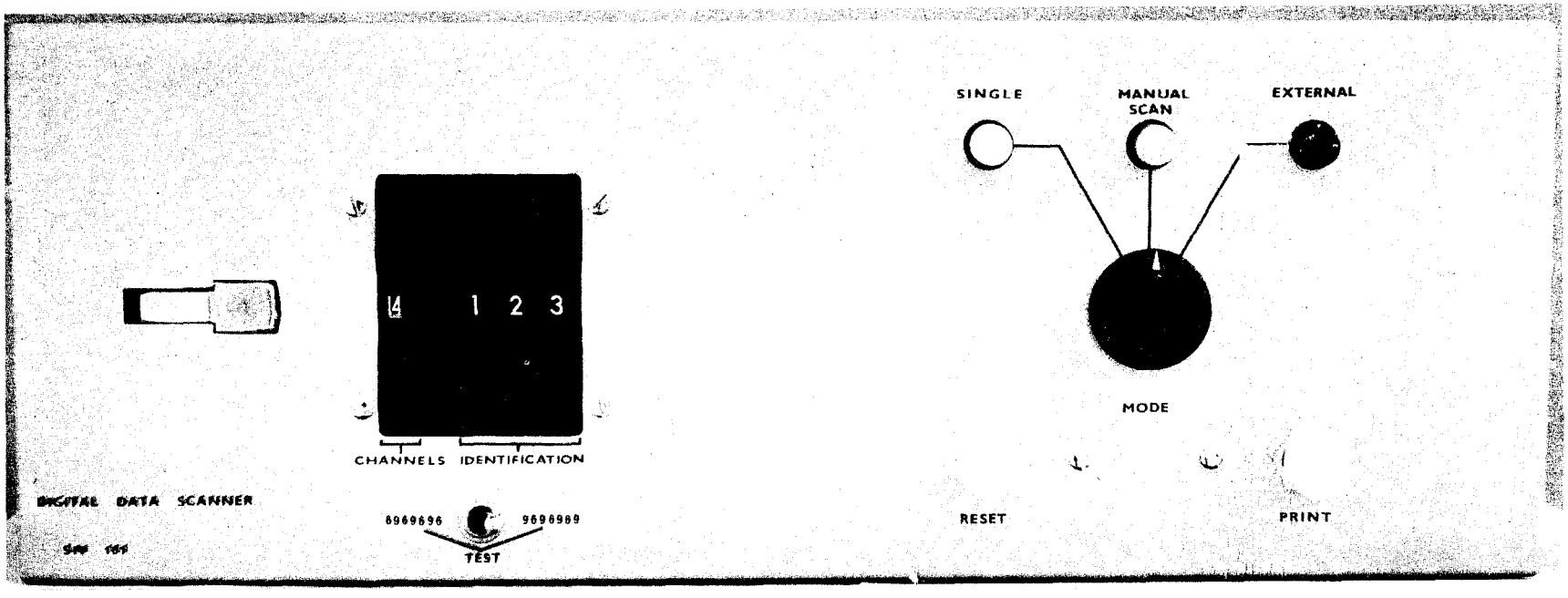

FIG. 5--Front view of the Digital Data Scanner.

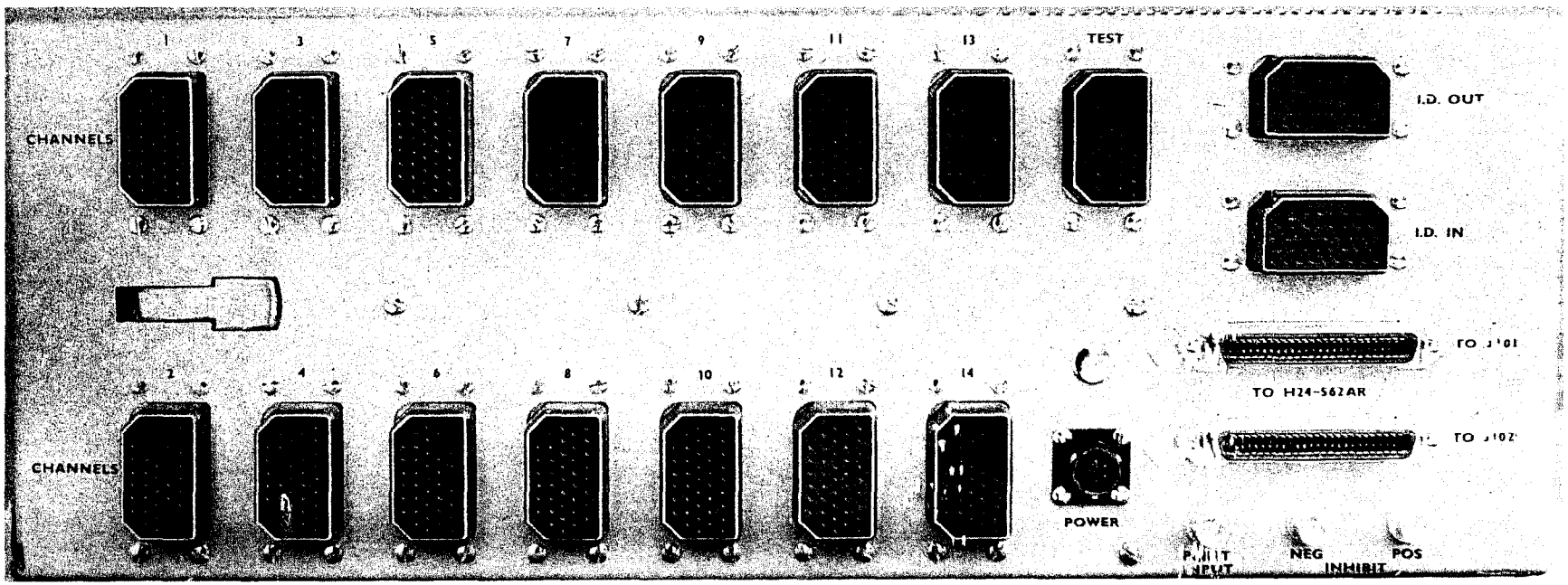

FIG. 6--Rear view of the Digital Data Scanner.

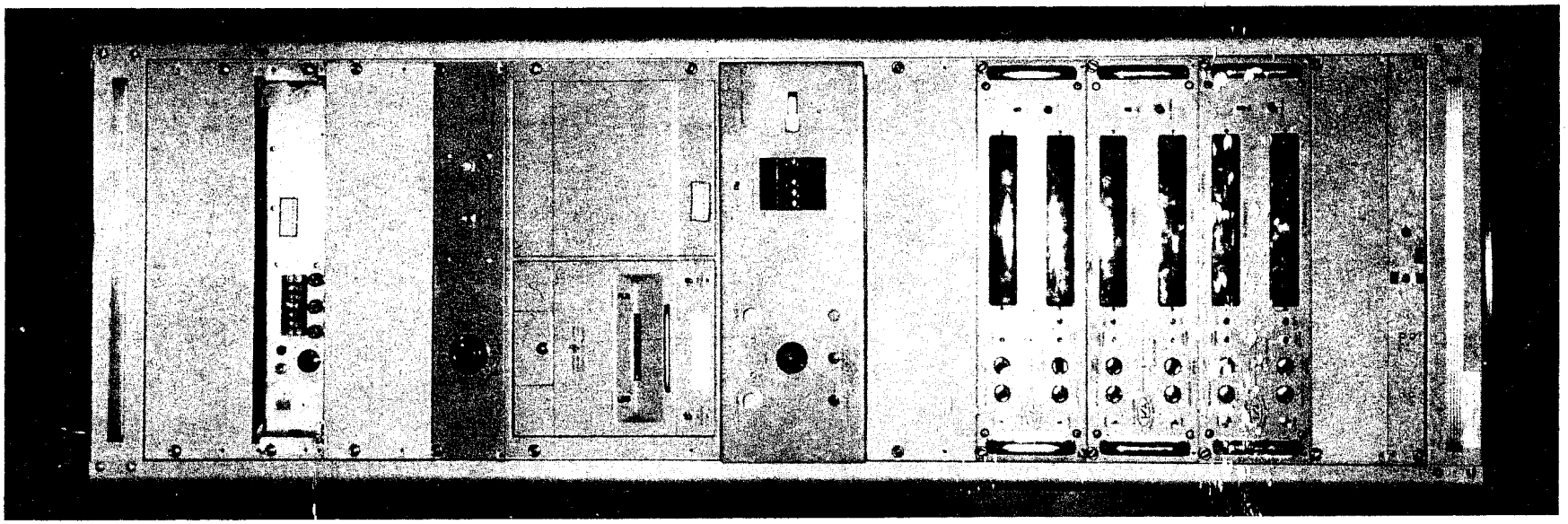

FIG. 7--Typical setup for an experiment.