516 Document

516-22
DRW
3/14/69

A REPEATER FOR THE NODE MODEM

A repeater accurately in time copies what is on its input to its output. In reference to notes 516-10, -11, -12, -18, the repeater is used to facilitate the sending and receiving messages between the computer and various devices thru an IO coaxial loop. The IO loop has repeaters at various nodes which the various IO devices are attached. Each Node has a Node Modem between the repeater and the device to change serial stream data to a parallel 8 bit byte for the device and vice versa. Figure 1B shows the basic blocks used in the repeater and Figure 2 gives the detailed circuits of the repeater.

1. The Input Network (Figure 2B) - The input signal is a.c. coupled and re-referenced to the repeaters gnd(f). The emitter follower allows the "Or Input Gate" to be driven without loading to the input signal.

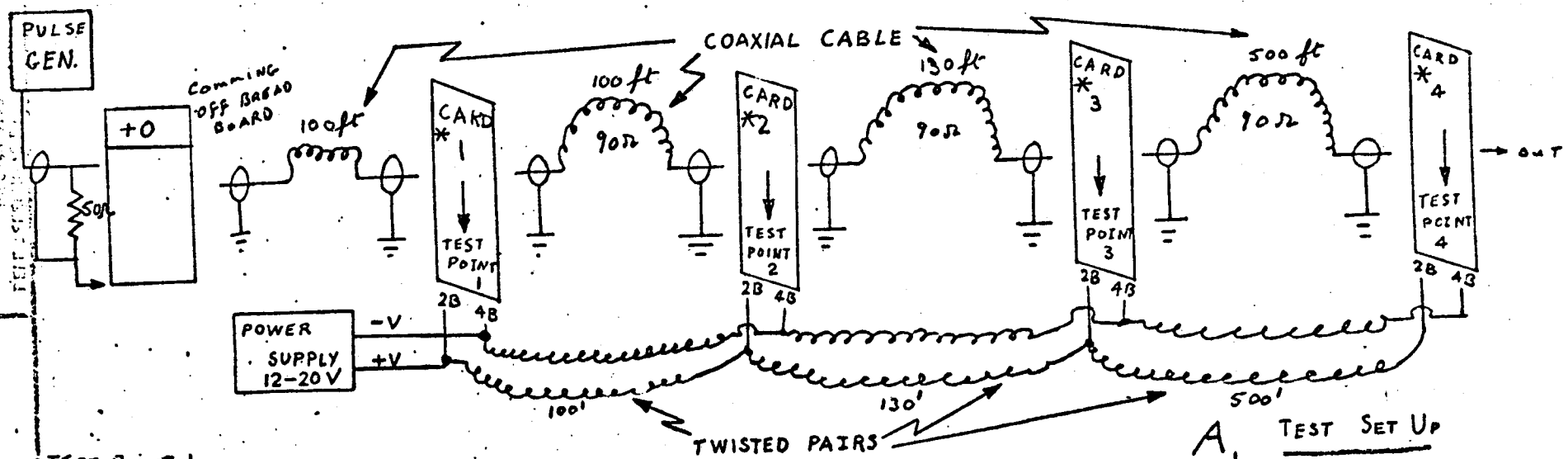
2. The "Or Gate" is a Motorola mc 3003 which is 9 nanosecond TTL "Or Gate". The "Input Or Gate" provides the input signal to the node modem and the "Output Or Gate". The "Output Or Gate" is three "Or Gates" wired in parallel to provide the drive for the coaxial cable. If the "Node Modem" is shut down (no power) or disconnected, its output to the repeater is gnd.

3. The "Output Network" (Fig. 2C) is used to form a negative impedance output to compensate for the coaxial cable capacitance. Figure 3 - a test for the output network on 500 feet of 93 ohm coaxial cable. Figure 3b shows no compensation network at the driving source A. At TP-B (the terminated end) the effect of the capacitance and the high frequency loss of the cable is evident. Figure 3a shows that overdrive at source end TP-A and terminated end TP-B. Figure 3c shows the overdrive at source end TP-A to give a square wave at the terminated end TP-3. Adjusting the 500 ohm output network (3d) potentiometer to give minimum time difference (3e) between repeater outputs to the Node Modem (TP-3 and TP-4). The conclusion is. with a proper equalized driven line that gives a square wave at the terminated end also gives a minimum time difference between repeaters (3f).

4. A "Floating Supply" (Fig. 2A) is used to power the repeater and let widely different device grounds be a reference to the voltage that powers the repeater. A floating supply (12V to 48V) at the Computer Ring Interface and a twisted pair or private phone wires are used to furnish the basic voltage for the floating supply at the repeaters. The output of the repeaters floating supply is +5 volts (+5f) and -0.4 volts (gf). The -0.4 volts (gf) gives additional noise margins to the input logic of the Node Modem.

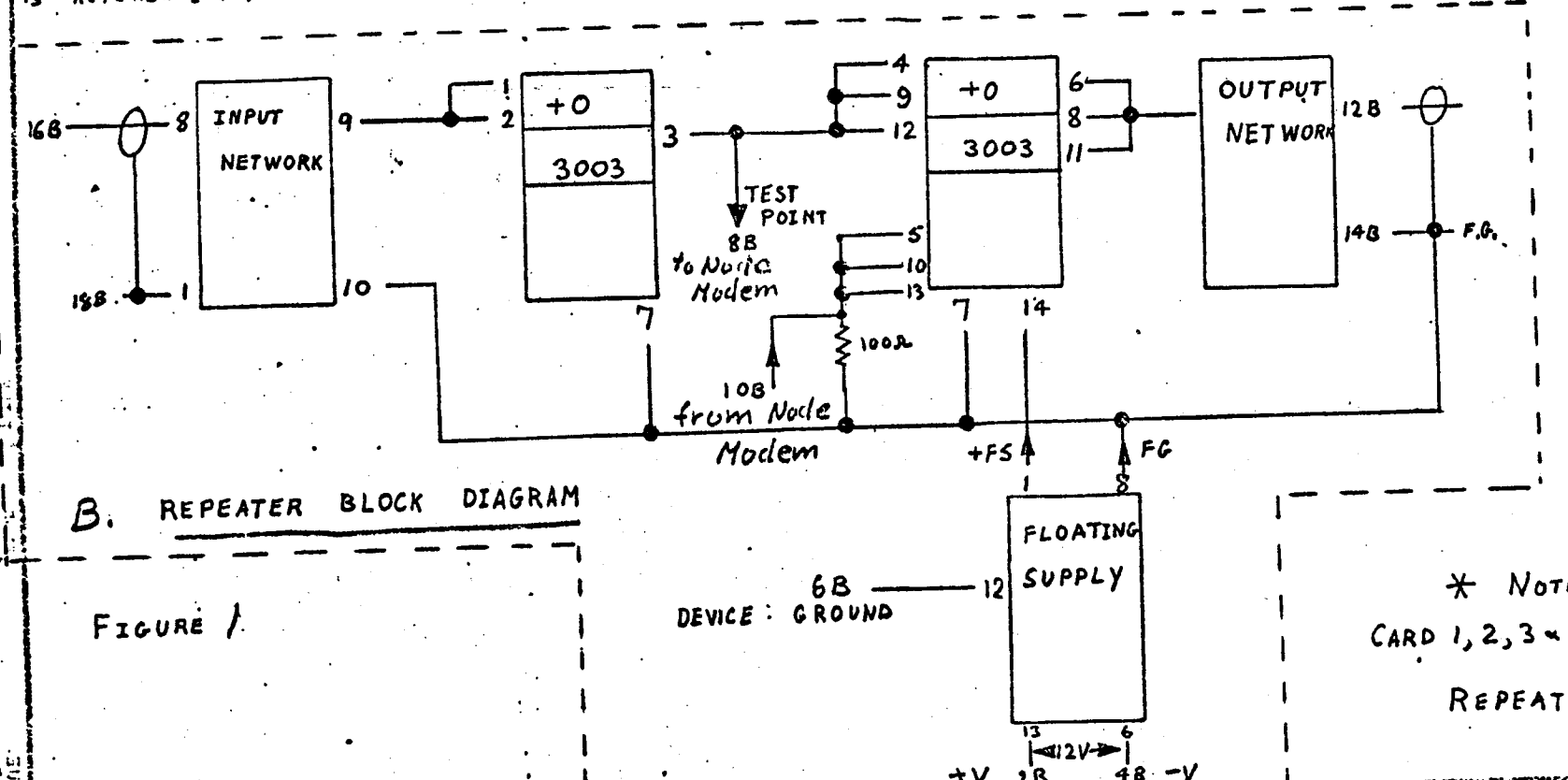
   A test setup on 500 feet, 93 ohm coaxial cable (Fig. 4) between two repeaters with widely varied grounds demonstrated the effect on the signal in a repeater. A 1000 hertz signal of 10 volts peak to peak shows a modulation of the back edge (#4) repeaters signal (TP-4). If the frequency was lowered to 360 hertz then no appreciable modulation effect was disernable (Fig. 4).

5. A test circuit was constructed to show time differences of ~~thru~~ 4 repeaters and various lengths of cable (Fig. 1A). The results of test are shown in Fig. 5 for a 100 nsec. (zero) pulse, for a 150 nsec pulse and for a 200 nsec (one) pulse. These results are very satisfactory for the intended purpose.



A. TEST SET UP

TEST POINT 1 IS REFERENCE PT.



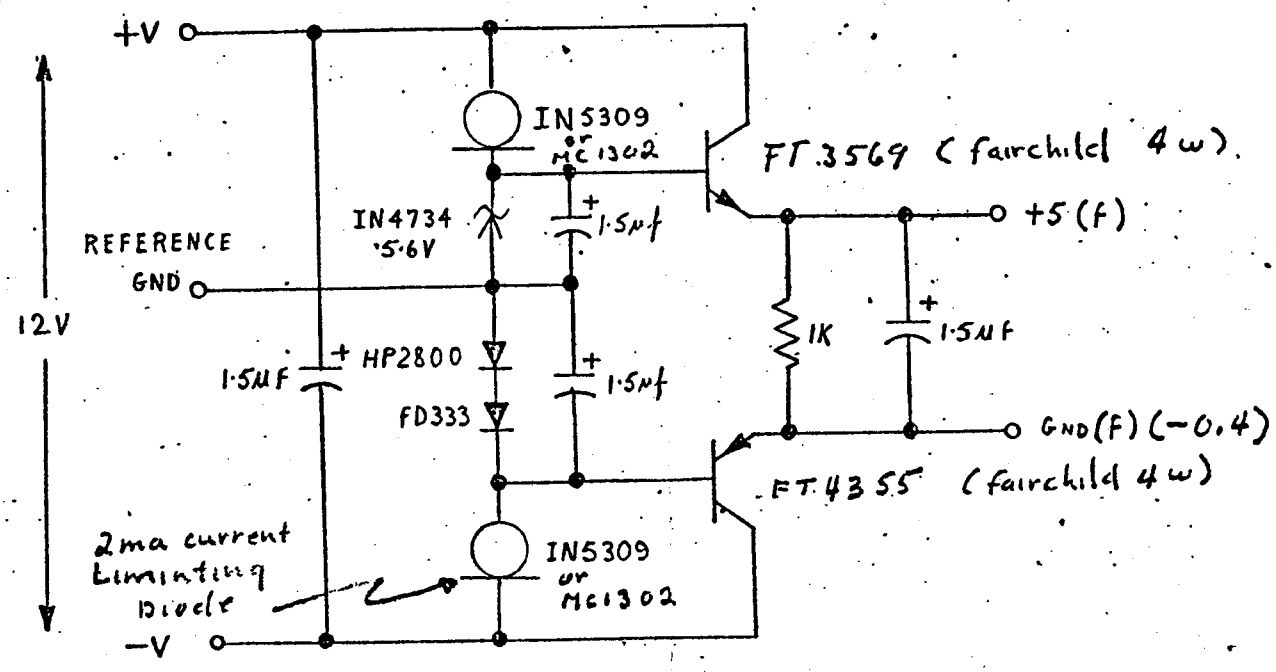
B. REPEATER BLOCK DIAGRAM

FIGURE 1

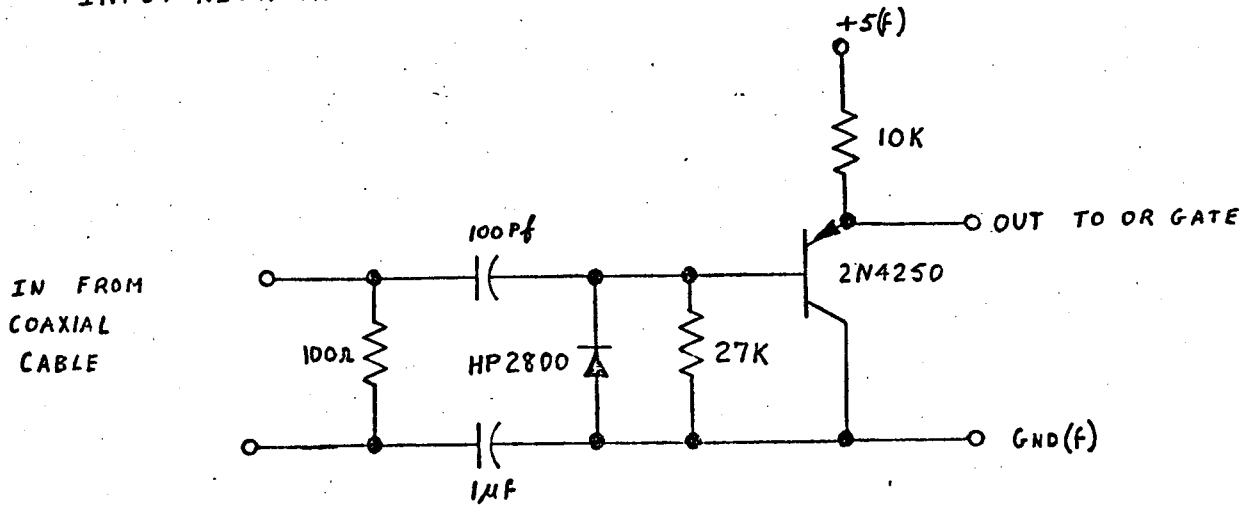
* NOTE
CARD 1, 2, 3 & 4 ARE REPEATERS

Figure 1

A. FLOATING SUPPLY



B. INPUT NETWORK



C. OUTPUT NETWORK

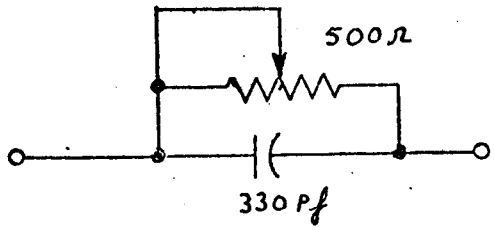


FIGURE 2