



**Fermi National Accelerator Laboratory**

**TM-1648**

## **16 Channel ECL Repeater**

Dan Graupman  
*Fermi National Accelerator Laboratory*  
*P.O. Box 500*  
*Batavia, Illinois 60510*

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## RESEARCH DIVISION / RESEARCH FACILITIES DEPARTMENT

### 16 CHANNEL ECL REPEATER

(DAN GRAUPMAN EXT. 3614)

#### **Function:**

Provides regeneration and reshaping of differential ECL signals after attenuation due to long cable lengths. The circuit is designed to receive and buffer 9 ns wide pulses at rep rates from 0 to 53 Mhz after 100 feet of twist and flat cable.

#### **Description:**

Each board has 16 channels. Input and output connectors are 34 pin headers. The repeater functions as a retriggerable leading edge triggered one-shot. The output pulse width is adjustable by a 10 turn potentiometer from 0 ns to about 120 ns, regardless of the input pulse width. The pulse width variation between channels is equal to about plus or minus 1.5 ns when adjusted to about 9 ns output width. Delay in to out is 7 ns plus or minus 1 ns. A NIM output which is the "OR" of the 16 channels is also provided (lema connector). Delay from in to OR out is 12 ns plus or minus 1 ns. The boards can be packaged in a NIM module. They are currently being used in an open frame card cage.

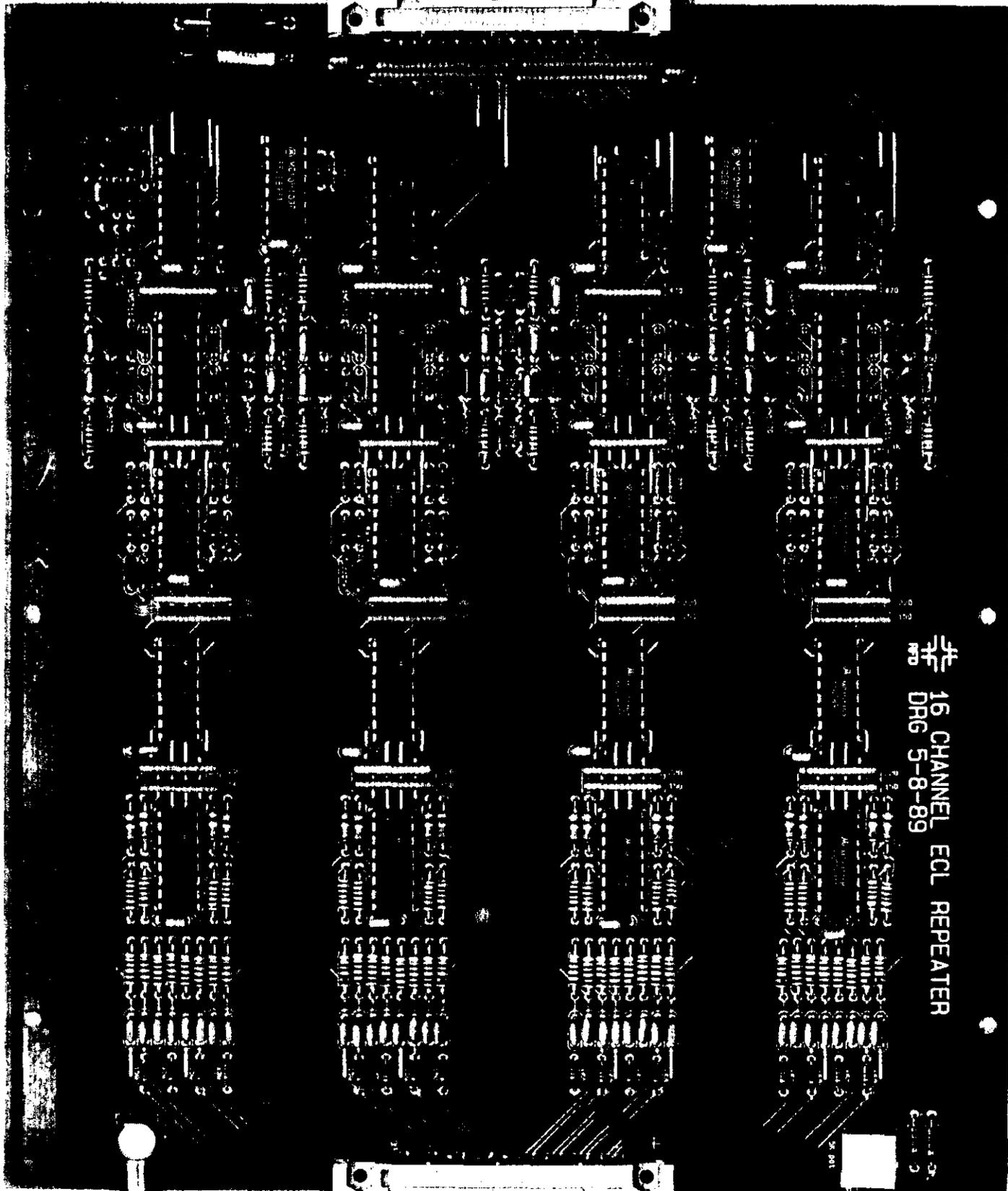
#### **Circuit description:**

The ECL inputs are capacitively coupled to a bias voltage level. The negative input bias is set at about -1.21 volts, the positive bias is set at about -1.29 volts. The differential input impedance is 150 ohms at DC to 78 ohms at 200 Mhz. A schematic of the first four channels is included, channels 5 thru 8, 9 thru 12 and 13 thru 16 are duplicates of the first four. Pictures of signals are also included to show what can be expected from the repeater. The first picture in each group is the signal into the beginning of 100' of twist and flat cable, the second picture is what the signal looks like at the input to the repeater, and the third picture is the output of the repeater.

#### **Power requirements:**

-6 volts at 1.75 amps., circuit is fused with a 3 amp. pico fuse at the power input.

OUTPUT

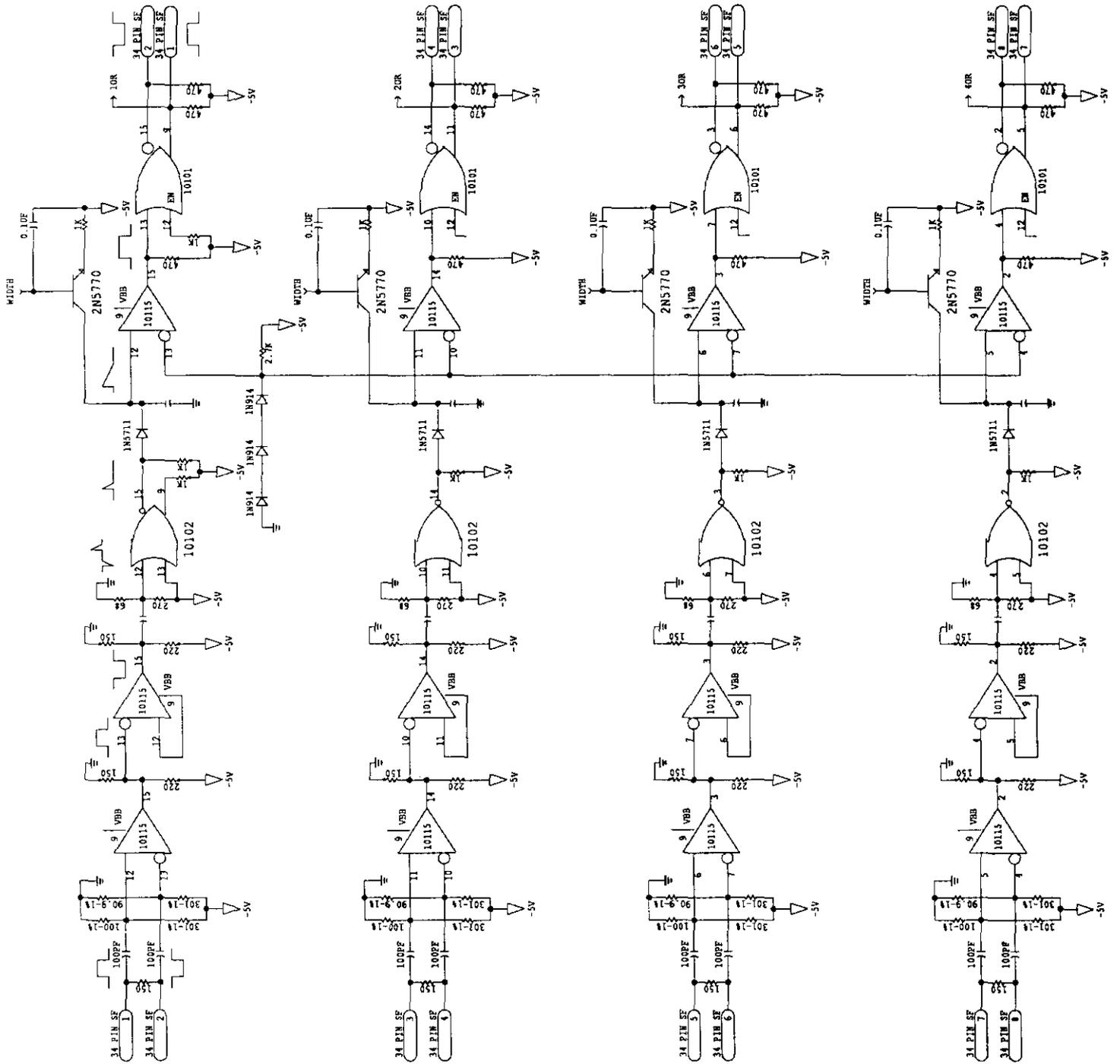


$\neq$  16 CHANNEL ECL REPEATER  
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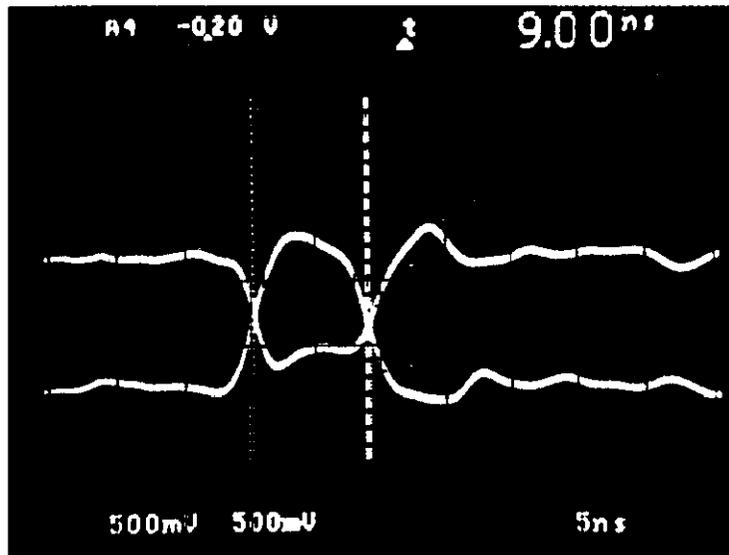
OR

INPUT

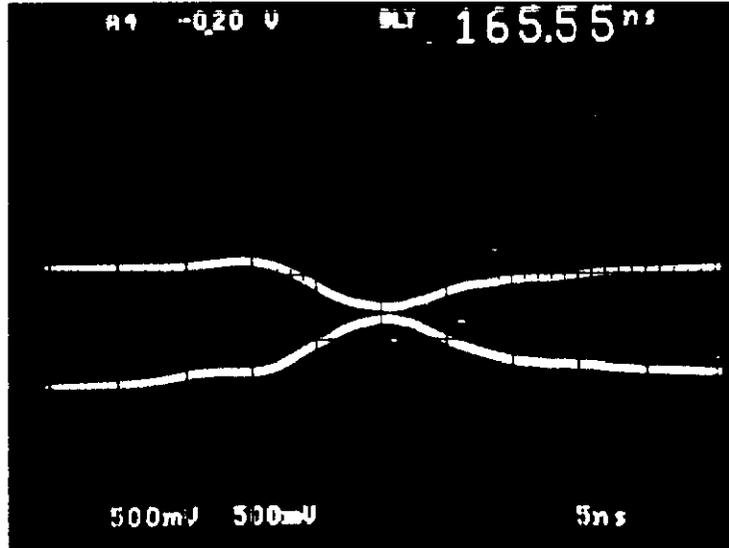
WIDTH  
ADD.



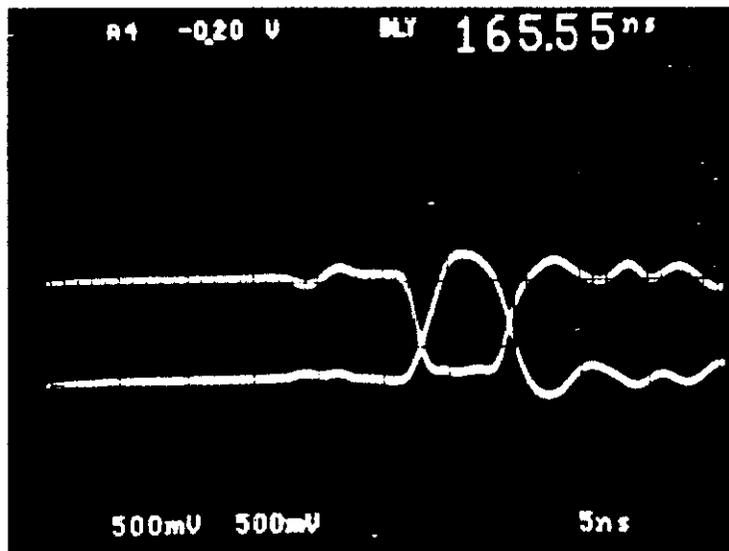
9 ns differential pulse into  
100 feet of twist and flat  
cable.



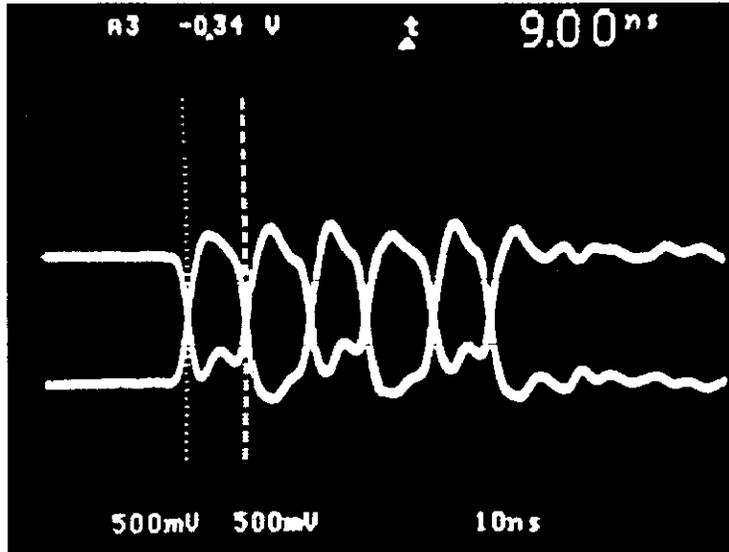
After 100 feet of cable, at  
input to repeater



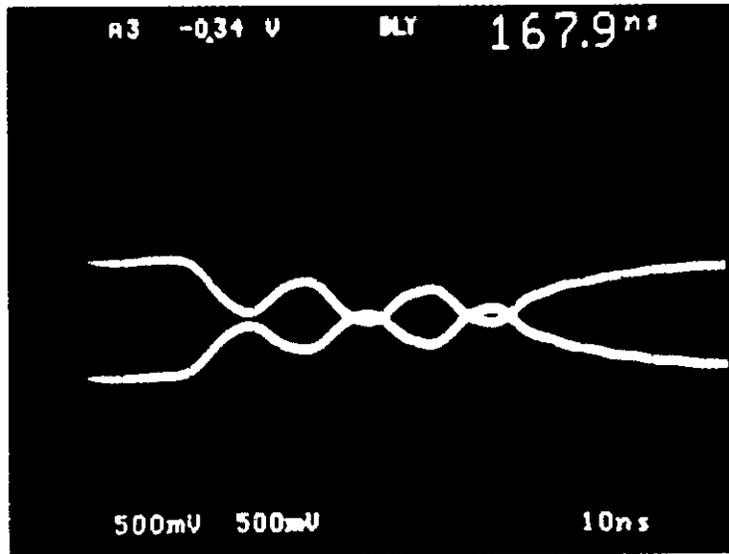
At the output of the repeater



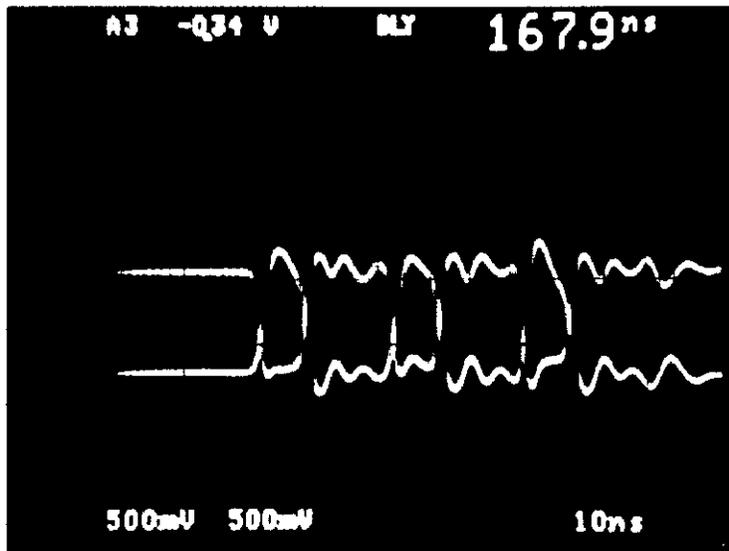
Three 9 ns wide pulses at 18.8 ns intervals into 100 feet of twist and flat cable.



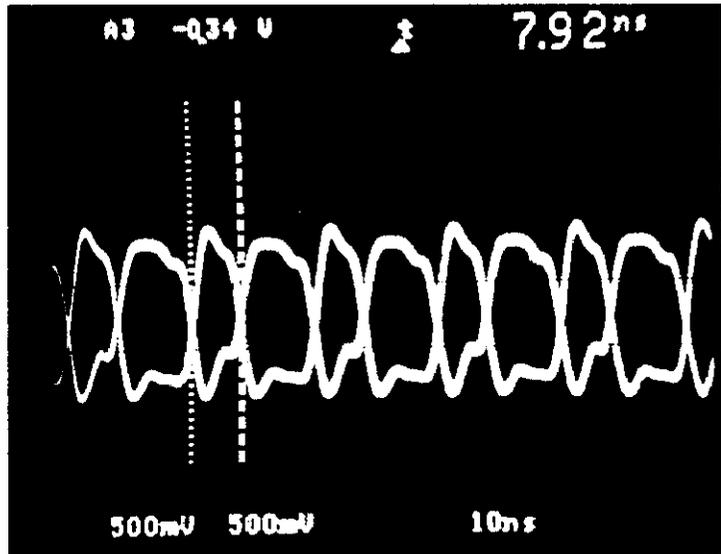
After 100 feet of cable at the input to the repeater. The traces show the effect the time constant of the cable has on the signal.



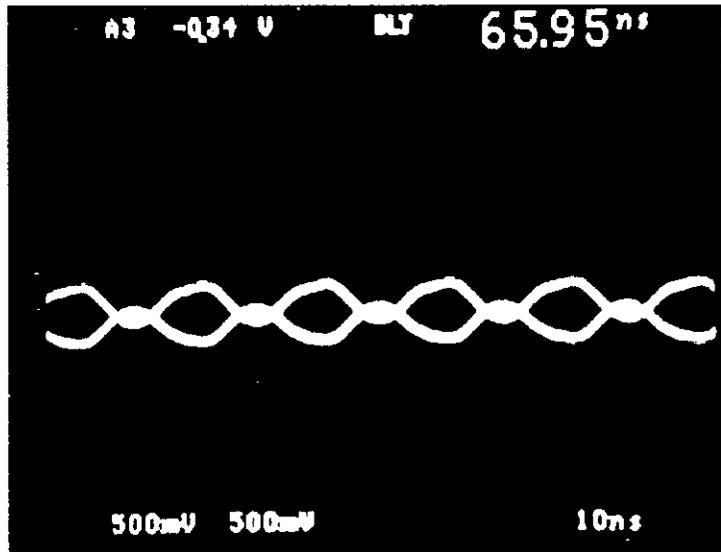
At the output of repeater.



7.92 ns pulses at 53 Mhz into 100 feet of twist and flat cable.



After 100 feet of cable into repeater.



At output of repeater.

