



GW-- 371522 (Circuit 1)

Input Levels		Output Levels		Delays (Usec)		
Min.	Max.	Min.	Max.	Turn On	Per	Circuit
-0.2	+0.2	5.5	5.9	Turn On	Nom.	0.21
-11.5	-12.48	-18.3	21.1		Turn Off	

GW-- 371522(Circuit 2)

Input Levels		Output Levels		Delays (usec)		
Min.	Max.	Min.	Max.	Turn On	Per	Circuit
10	40	-0.2	+0.2	Turn On	Nom.	.17
-30	-60	-11.5	-12.5		Turn Off	

**Converters: (1) U to X Levels; (2) X to U Levels**

The gw -- card consists of two separate circuits used for converting between tube and transistor levels. Circuit 1 accepts a U level from a CTDL logic block and provides an out-of-phase X level that is used to drive a vacuum tube circuit. Circuit 2 accepts a vacuum tube X level from a cathode follower and provides a CTDL U in-phase output capable of driving one CTDL logic block.

**Circuit Description**

**CIRCUIT 1.**

When the U line is up (0v), the base level of T3 is set near +7.5v by the divider network of D32, R30, and R15 to +30v. T3 is reverse-biased and off. The collector of T3 is near -20v and forward-biases T1 on and reverse-biases T2 off. The output from the complementary emitter followers is near -19.7v at this time. When the input signal drops to -12v, T3 becomes forward-biased and conducts. The collector of T3 goes to +6v and causes T2 to be forward-biased and T1 to become reverse-biased. Conduction through T2 causes the output at pin D to increase to +5.7v.

D32 is a protective measure for T3, and provides a path to the +30 volt base supply voltage in case the input driving circuit is removed from pin A. Because of the high switching voltages at the base-emitter junctions of T2 and T1, D8 and D3 are used to protect the transistors by limiting the reverse-bias voltage at the base of these transistors. R2, R9, R5, and R6 limit the current flow through the transistors. The use of the complementary emitter followers gives a sharp rise and fall of the output signal waveform.

**CIRCUIT 2.**

When the cathode follower output is up, conduction through D22 and R20 clamp the positive output seen at pin C to approximately 0v. Similarly, when the cathode follower output drops to -35v, D19 becomes forward-biased and limits the negative output at pin C to near -12v.

**Application**

These circuits are found in systems using both CTDL logic and vacuum tube data processing equipment.