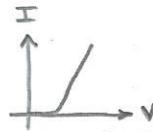


BASICS OF TUNNEL DIODES

(THE "BUCKING BRONCO" OF DIODES)

- NOT A "NORMAL" DIODE

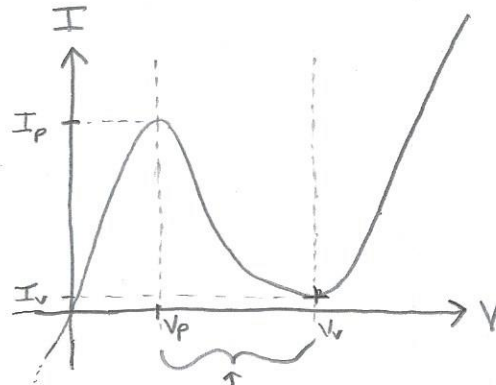


- INVENTED IN LATE 1950'S
BY LEO ESAKI

(RECTIFIER, SWITCHING, ZENER, PIN, VARACTOR, LED, ETC.)

- REFERENCES IN
VIDEO DESCRIPTION

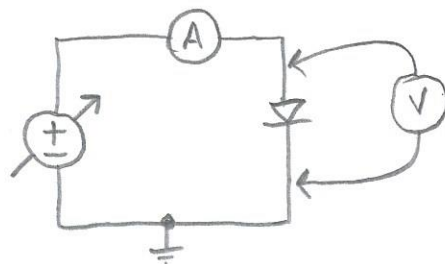
- UNUSUAL & UNIQUE I-V CHARACTERISTIC:



NEGATIVE "DIFFERENTIAL" RESISTANCE REGION

- THE NEGATIVE DIFFERENTIAL RESISTANCE REGION IS AN "UNSTABLE" REGION TO OPERATE (POSITIVE FEEDBACK, ETC.)
- EVEN MEASURING THE I-V CURVE IS REMARKABLY TRICKY / DIFFICULT TO DO BECAUSE OF OSCILLATION

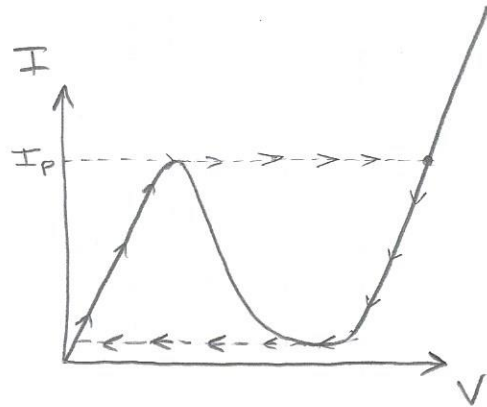
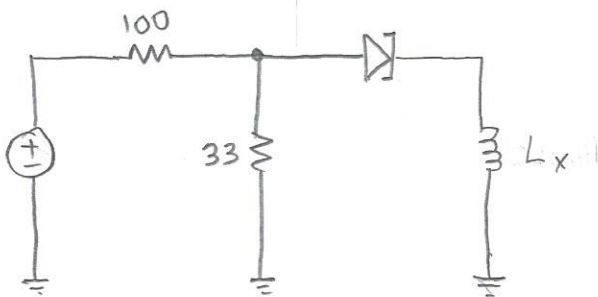
NORMAL DIODE / DEVICE I-V
MEASUREMENT SETUP



TUNNEL DIODE APPLICATIONS

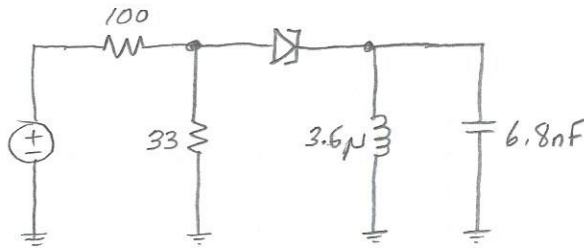
- VERY FAST SWITCHING THROUGH THE NDR REGION
- OSCILLATORS
- TRIGGER CIRCUITS
- LOGIC CIRCUITS

SIMPLE RELAXATION OSCILLATOR



-BIAS TO JUST PAST I_p ...

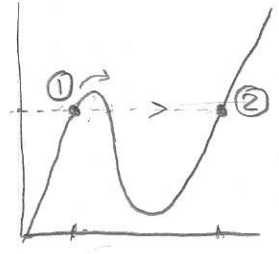
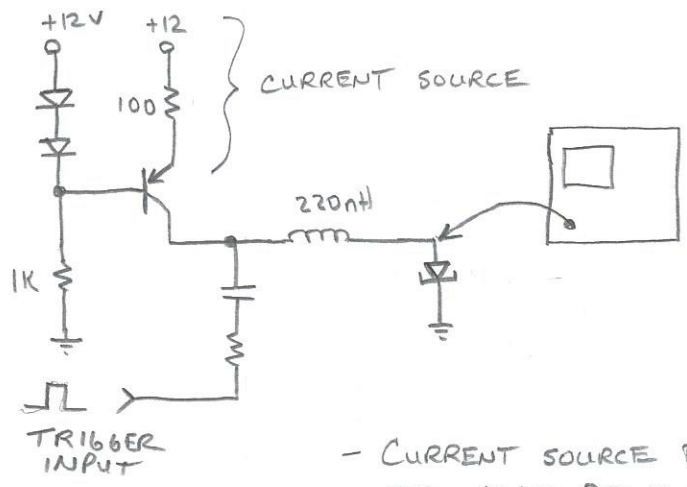
... ADD A TANK CIRCUIT FOR MORE "CONTROLLED" OSCILLATION



$f \approx 1 \text{ MHz}$

W2AEW

MONOSTABLE "TRIGGER" CIRCUIT



- CURRENT SOURCE BIASES TD TO JUST BELOW I_p ①
- TRIGGER PULSE PUSHES THE TD "OVER THE EDGE"
- INDUCTOR REACTS TO FALLING CURRENT BY INCREASING V_D UNTIL POINT ②
- VERY FAST!