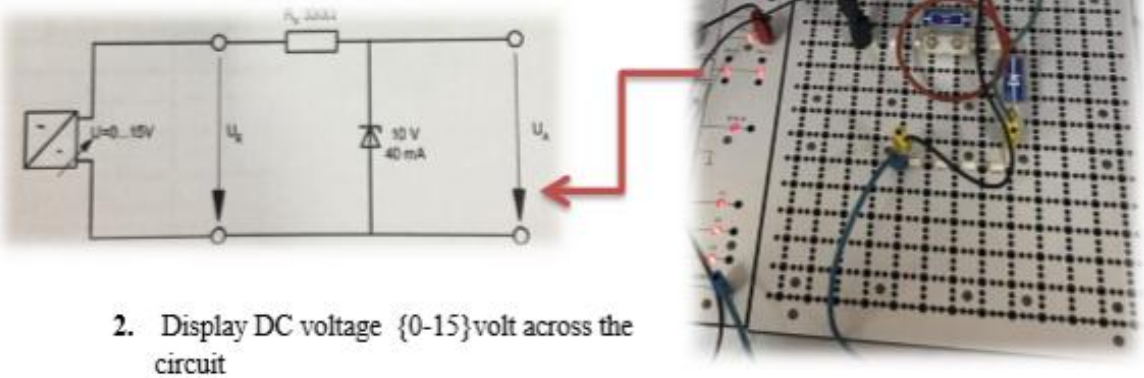
Introduction

In this experiment we are going to study:

1. The relationship between output voltage and input voltage (DC voltage limitation with z-diode)
2. The relationship between Z current and input voltage (DC voltage limitation with z-diode)
3. Measure the effects of load current IL
4. Study the AC voltage limiting and overvoltage protection with Z-diode

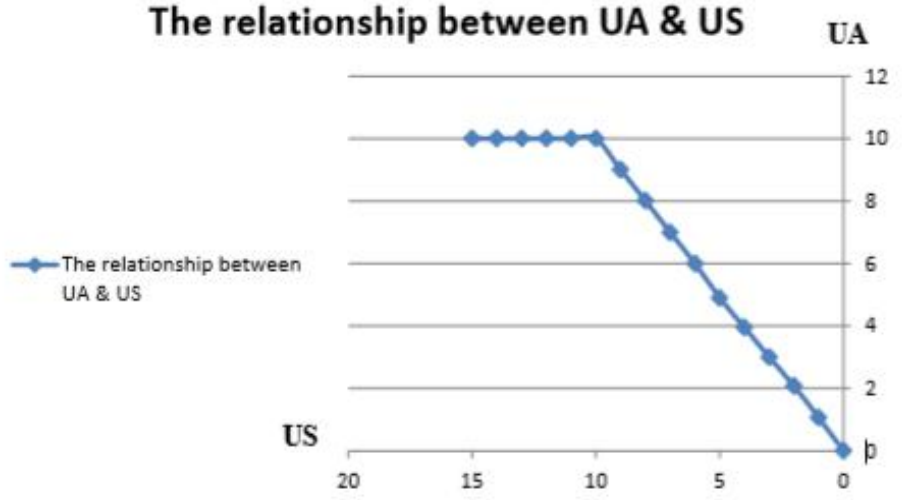
Procedure:

- **Part one**(the relationship between Us and UA)
  1. Connect the circuit as shown.



  2. Display DC voltage {0-15}volt across the circuit
  3. Measure the voltage across the diode(see the attached table)
  4.

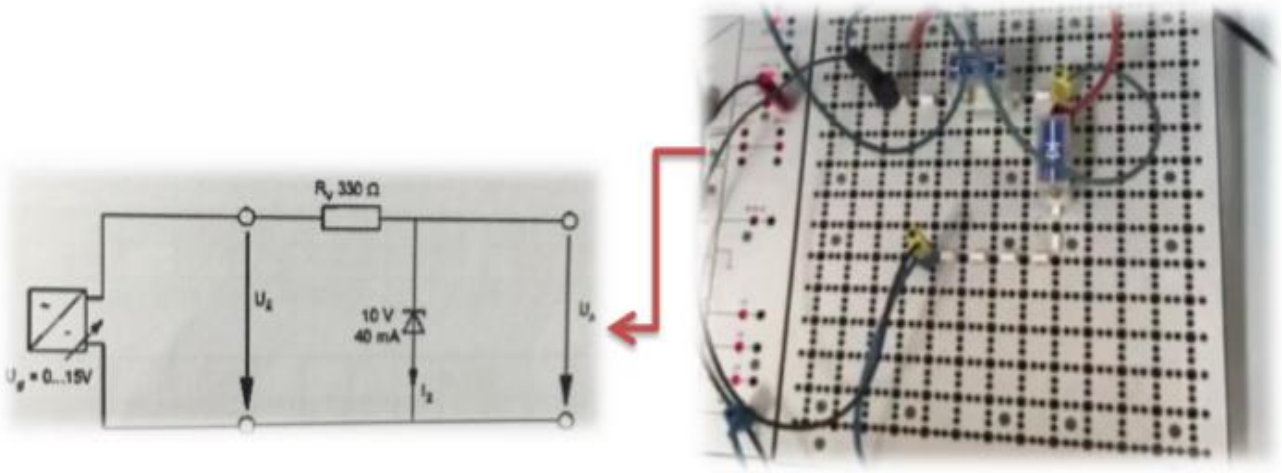
US v	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
UA v	0	1.06	2.08	3	3.95	4.9	6	7	8.01	9	10	10	10	10	10	10



Part Two((the relationship between IZ and UE)

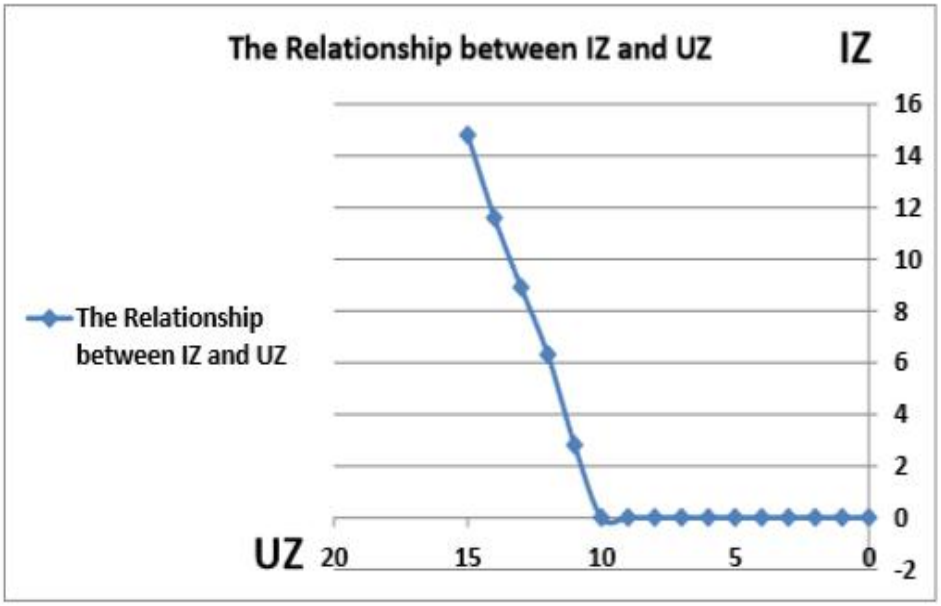
Procedure:

1. We connected the circuit as shown



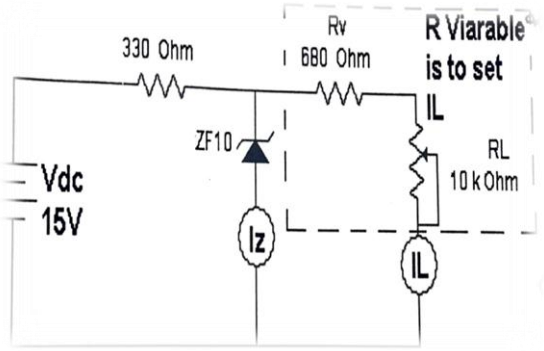
2. Display DC voltage {0-15}volt across the circuit
3. Measure the current through the diode.(see the attached table)

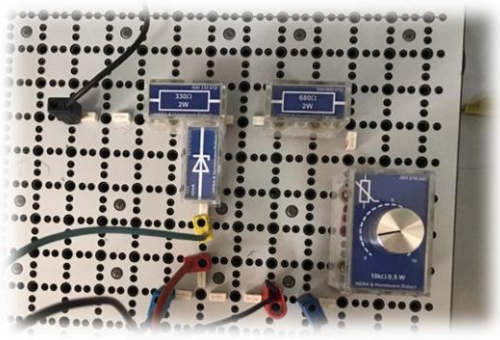
Uz	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
IZ	0	0	0	0	0	0	0	0	0	0	0	2.8	6.3	8.9	11.6	14.8



Part three (measure the effects of load current IL)

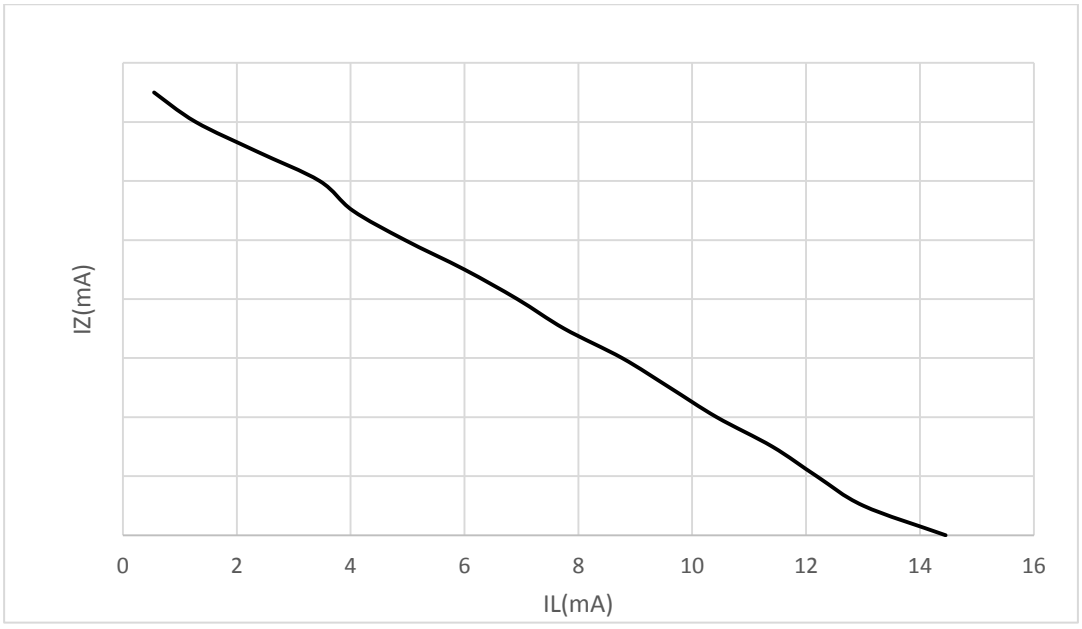
Here were going to control the current going through the Rl and examine the IZ and Il of the circuit, using the variable resistor ,as the IL increases through using the variable resistor.





IL	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
IZ	26.8	25.4	24.6	23.6	22.6	21.7	20.7	19.8	18.8	17.7	16.5	15.7	14.5	13.7	12.7	11.9

The relationship between (IL- IZ).



Test1: What condition is needed that the output voltage remains constant in a limiter circuit with Z-Diode?

Answer: Vs>Vz

Test 2: When does IZ flow?

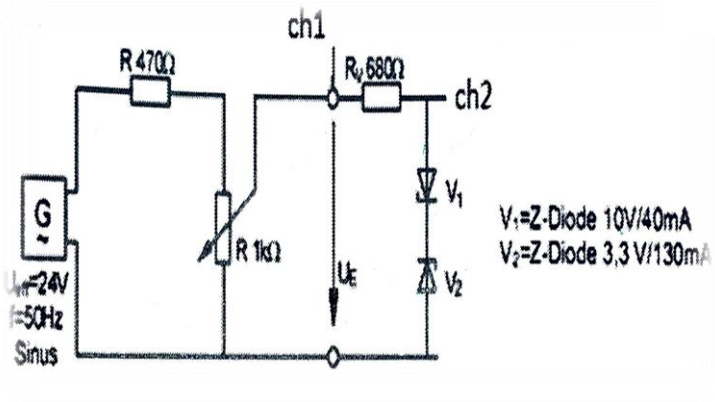
Answer :VS>Vz

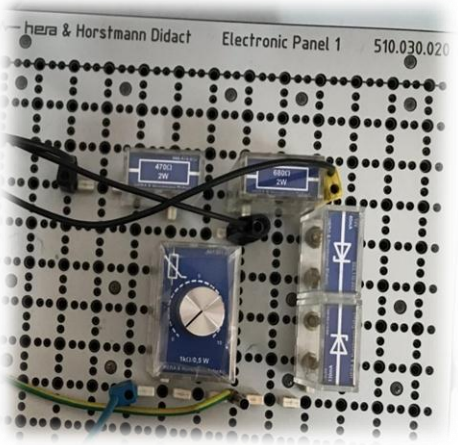
Test 3: Under which condition is the limiting effect maintained although under load?

Answer: Vs>Vz

Part four *(Voltage limiting and overvoltage protection with Z-diodes)*

The **Diode Clipper**, also known as a Diode Limiter, is a wave shaping circuit that takes an input waveform and clips or cuts off its top half, bottom half or both halves together to produce an output waveform that resembles a flattened version of the input. For example, the half-wave rectifier is a clipper circuit, since all voltages below zero are eliminated.





We connect the circuit as shown :

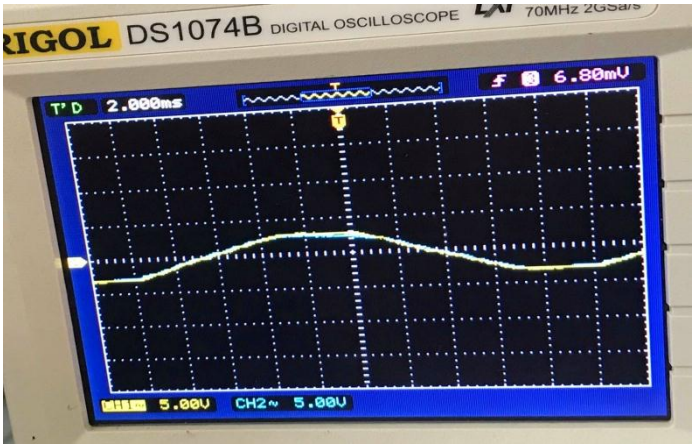
V1=Z diode 10V/40mA

V2=Z-diode 3.3V/130 mA

So when Ueff=10 volt

- The positive side cut at 4 volt (10-0.7-3.3=4v)
- The negative side cut at 10.7v

Now when the Ueff = 2 V



Where the Ueff less than the Vz the zener doesn't work (still full wave.)

- Do you know the application possibilities for a Z-diodes?
  Answer: a zener diode can work as a voltage regulator to protect loads from getting defected by unregulated voltage, it can also be a waveform clipper.

- State the advantage of two opposed directed Z-diodes?
  Answer: one of them for forward . the other will be reverse

Conclusion

Were able to understand the main role of the zener diode as a voltage regulator which is a Zener diode can be applied to a circuit to regulate the voltage applied to a load, as waveform clipper which is The output waveform will be clipped at the zener voltage plus the 0.7V forward volt drop of the other diode and as a voltage shifter as it can be applied to a circuit with a resistor to act as a voltage shifter. This circuit lowers the input voltage by a quantity that is equal to the Zener diode's breakdown voltage.