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## THERMOELECTRIC AIR CONDITIONING

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**Abstract:** - The thermoelectric cooler described in this paper can be used for cooling and heating the vehicles, houses and offices. This new technology does not releases any greenhouse gasses and it consumes very less energy as compared to the conventional High Voltage Air conditioning systems. Conventional systems uses compressor to cool the surroundings. This air conditioning system works on the principal of seebeck and peltier effect. This system does not need any coolant, and it is durable. There are no moving parts in the system as compared to the conventional Air-conditioning system so its repairing cost is negligible.

**Keywords:** High voltage Air Conditioning system, TEC, Thermo electric, seebeck effect, peltier effect



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## 1. INTRODUCTION

Now a day's different types of cooling systems are available in the market. Most of the electricity generation relies on the coal power plants, which add greenhouse gases to the atmosphere is the major cause of global warming. Our design approach is to make a cooling system which is power efficient and environment friendly. We are trying to reduce the cost and area requirement for cooling system.

Thermoelectric devices (TED) have found their way into a variety of cooling applications. Packed with two to hundreds of p and n types of BiTe base semiconductors and utilizing the Peltier cooling principle, the BiTe substrate can transport heat from the semiconductor's cold junction to hot junction without any moving parts.

## 2. MATERIALS

### a. Thermo electric couple

Thermo electric couples are the electronic devices which can change the temperature difference to electric energy and vice versa. A typical thermoelectric couple consists of an array of p- and n- type (*Bismuth* and *Telluride* is most commonly used) semiconductors element that act as the two dissimilar conductors. The array of element is soldered between two ceramic plates, electrically in series and thermally in parallel.

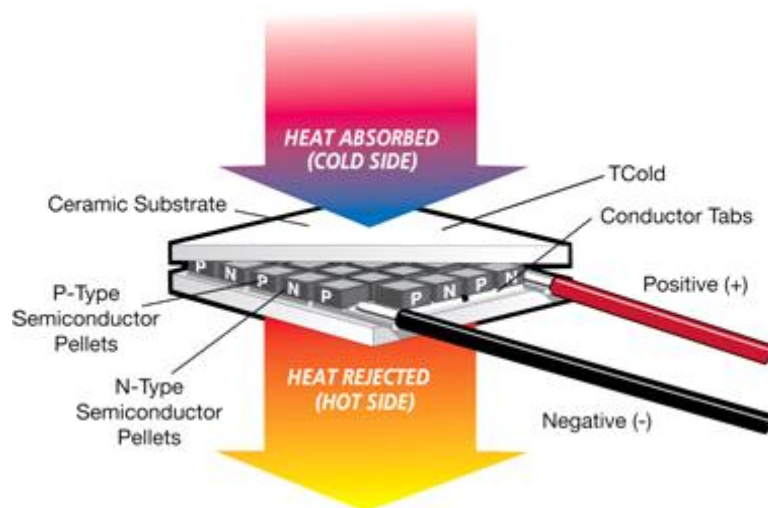


Fig (1): Working of TEC

### 3. WORKING

THERMOELECTRIC COOLING SYSTEM works on the principal of Thermoelectric effect, Peltier effect. Thermoelectric cooling system uses the Peltier effect to create a heat flux between the junctions of two different types of materials. This system transfers heat from one side of the device to the other by using electrical energy.

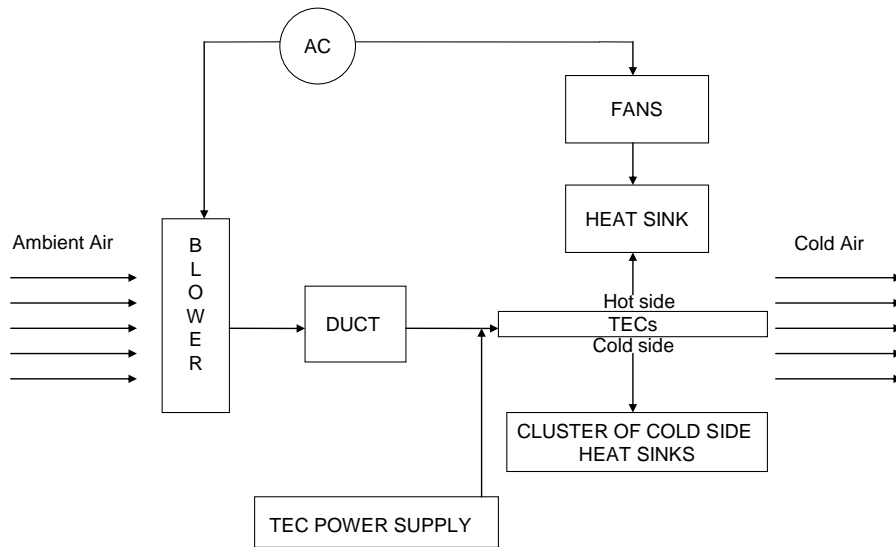


Fig (2): Block diagram of model

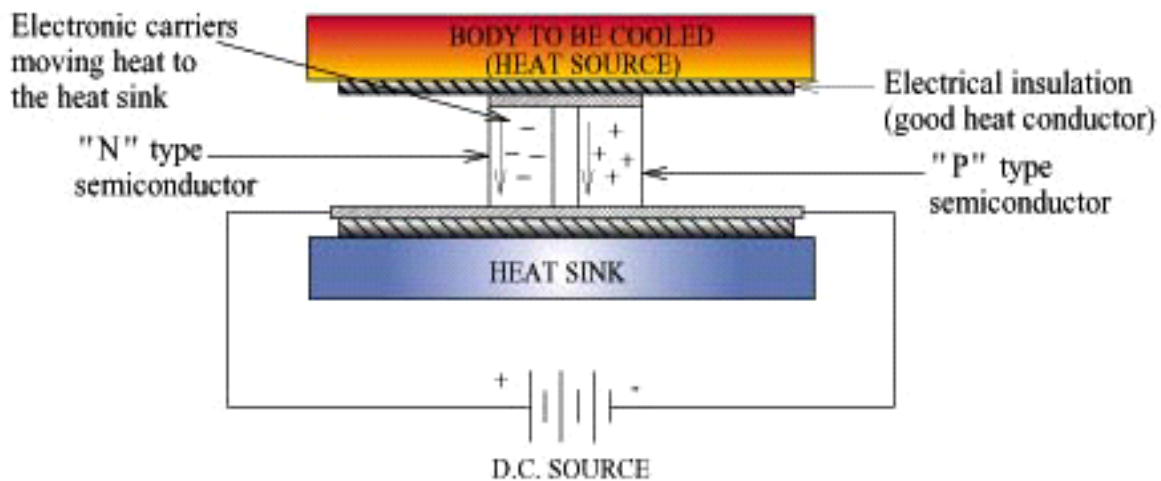


Fig (3): Peltier effect

#### 4. ARRANGEMENT OF TECs

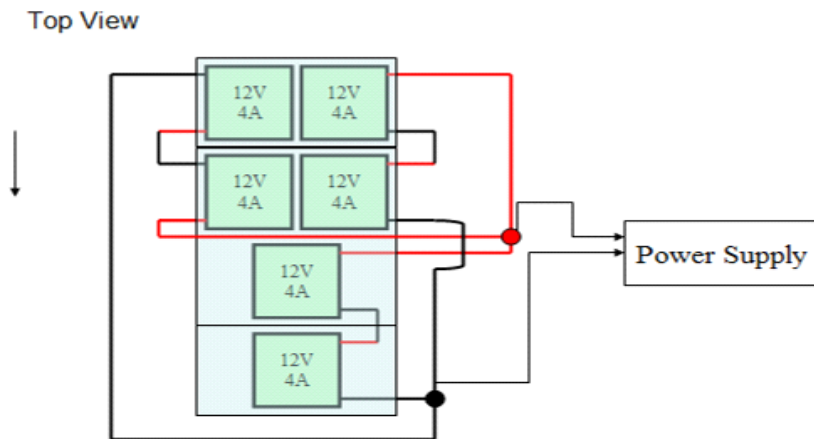


Fig (4): TEC arrangement in model

#### 5. ADVANTAGES OF THERMOELECTRIC COOLER:

- Thermoelectric cooling system is highly reliable provided they are installed and used in an appropriate manner. Thermoelectric modules that are at steady state can have mean time between failures in excess of 200,000 hrs(23 years)
- It can be used as heater also. Since thermoelectric coolers are solid state heat pumps, they can actively pump heat from the ambient in addition to the heating effect that comes from the electrical resistance of system itself.

Thermoelectric modules exhibit relatively high mechanical strength.

#### 6. RESULT:

We have implemented the design installing in a car (maruti 800) in the different times of the day. Results and findings as follows

- TEC cooling designed was able to cool an ambient air temperature from 30 to 22.8 . Cooling stabilizes within three minutes once the car blower turned ON. The system can attain a temperature difference 7 Degree.
- The Fitment of TEC air cooling needs to install at Roof, Floor, Doors .will improves the results.

Time (s)	Temperature at Outlet
0	30.5
10	28.5
20	27.7
30	27.2
40	26.6
50	26.1
60	25.7
70	25.3
80	25.0
90	24.6
100	24.4
110	24.1
120	23.9
130	23.8
140	23.5
150	23.3
160	23.2
170	23.1
180	23.0
190	23.0

Fig (5): Temp reading after installing the system in car

Time (Min)	Temperature Inside Car heat
0	40.0
5	40.0
10	39.7
15	39.3
20	39.1
25	39..1
30	39.0

Fig (6): Testing at the noon when running on road

Time (Min)	Temperature Inside Car
2	28.5
4	28.3
6	27.8
8	27.2
10	26.6
12	26.1
14	25.0
16	24.3
18	24.1
20	23.6

Fig (7): Results at night

- Using thermoelectric cooling system has many advantages over conventional high voltage ac system.
- It saves environment. Saves money, long lasting.

## 7. REFERENCES

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