COMPANY PROFILE: STATCON ENERGIAA

Since 1991, **Statcon Energiaa** is the **No.1 Indian Company** in the Power Electronics Sector with **25,000+ Project Sites** and **150+MW** of Solar Inverter Installations across the globe .It has endeavoured to pursue its industrial purpose and mission by specializing in design, manufacture and technical support of equipment for the static energy conservation, offer a diversified range of energy solutions in four major divisions which are Solar ,Power, Defence, Railways **to over 20 countries** in 3 continents.

STATCON ENERGIAA PVT. LTD. – outside view

Situated in Pilkhuwa with the head office in Noida, just 20 km away from Delhi, the manufacturing facilities include fitting, wiring, assembly and testing of all range of products. Manufacturing of all the sub modules, transformers etc is also done in-house.

Floor View Of Integrated Power supply And Battery Charger

STATCON ENERGIAA's most recent developments are focused on advanced Power electronics based on switching technology and use of advance digital embedded systems to ensure outstanding performance, backed by improved ,systematic diagnostics .The company has got **ISO 9001-2015** quality system. The quality standards are maintained . The quality process starts from initial targeted component section to the various intermediate stages.

The final product testing is done in accordance with the customers ‘s specification and set standards . for this all necessary Test Set up Equipments and Training is available in-house. In addition to above Type Tests are done by Outside Agencies/Test houses.

CONTRIBUTION IN VARIOUS SECTORS

SOLAR DIVISION: The **only company in India** to offer a complete range of String Monitoring and Combiner units and Solar Inverters including Hybrid (Storage + Grid export), String inverters, Central Inverters, Off Grid Solar PCUs Solar Cold Storages for the Agricultural Sector. One of the Largest Manufacturers of Solar Hybrid Inverters in the world and its wide range of solar products continuously delivers value and satisfies needs of the solar sector.

DEFENCE DIVISION: We have more than 250 GPUs with a rating of 40 kVA up to 100kVA are at the service of the Indian Air force, Indian Navy, HAL ,Private Civil aircrafts, **Govt. of Uganda, Nepal and Seychelles.** Shore supply battery cum rectifiers and Static/Rotary Frequency Converters up to 600KW for Ships and submarines are also serving the nation at Naval Dockyards of Vishakhapatnam and Mumbai. India's Largest Load bank at 1.25MW capacity is installed at Naval Dockyard, Vishakhapatnam.

POWER DIVISION: Statcon's battery chargers are spread across the length and breadth of India with over 20,000 units currently functioning. Clients include DMRC, Jaipur Metro, Indian Army, Air force, Navy, NTPC, NHPC, BHEL, NHDC, Electricity boards of MP, HP, Tamil Nadu, Gujarat, Rajasthan, Odisha,EIL,MECON,GAIL etc.

RAILWAYS DIVISION: Energiaa manufactures Integrated Power Supply systems for Railway Signaling Installations, Solar Level Crossing Gate (LC Gate) for remote areas, 48V Telecom power supply for Railways Signaling and comprehensive solar solutions with both Hybrid and Grid Tied Systems for Railway station utility services.

SOLAR SECTOR

OFF GRID SOLAR POWER SYSTEM

2 IN 1 INVERTER MODE

Select Solar Mode for when solar panels are connected, and Inverter Mode when using as a normal home inverter

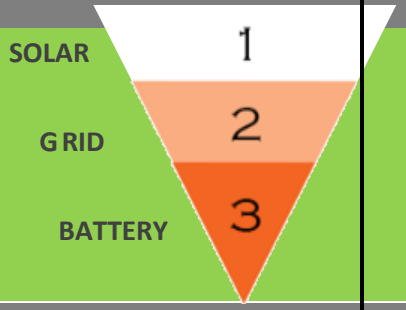
SAVE ON DIESEL COSTS

Rate of Diesel comes out to be approx. 18 ₹/ - Per unit and its daily usage is a major financial burden for the customer. With installation of a duly calculated Solar System , you can get cheaper electricity without any rising costs for a long time t o come.

PRIORITY SOURCE SELECTION

User Selectable modes based on your dynamic energy needs. S>G>B Mode is suitable for areas with frequent power cuts.

S>B>G for areas with fewer power cuts and a special mode of S>G>B * for urban households



FULFILLS ALL BATTERY REQUIREMENTS

Automatic Temperature Compensation to protect the battery from overheating

Can be charged via solar or grid separately

Pre programmed values for VRLA, LMLA and Ni -Cd Battery Selection

EXTRA LARGE LED DISPLAY FOR VISUAL ERGONOMICS

The largest LED display currently for any Solar PCU in India. Makes for better viewing and shows an incredible amount of Data of your inverter.

The display itself has ZERO power consumption thus increasing its efficiency as a whole .

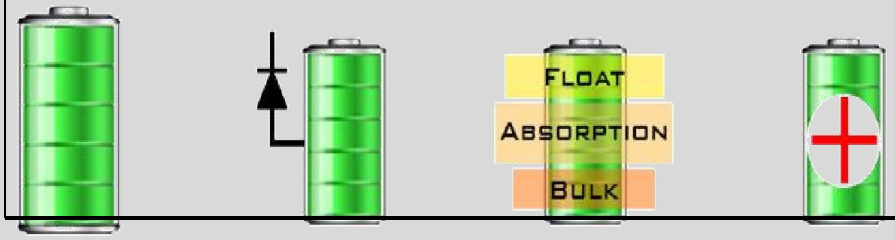
MADE IN INDIA

These Off Grid Inverters are MADE IN INDIA, and especially made to perform in the testing environmental conditions of INDIA and other such developing countries where the grid supply is unreliable and fluctuating

REMOTE MONITORING

Now know every fine detail of your solar SEO -OG Series inverter with the industry leading Xenius Software from Radius Monitoring. This can be easily accessed via GPRS or RS 232. It Shows you graphs and Numbers of your daily, weekly , monthly and yearly unit consumption patterns apart from a multitude of other features.

IDEAL FOR A HEALTHY BATTERY

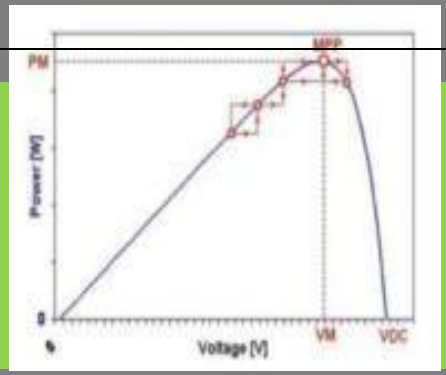


Multistage Battery Charging for optimised charging process

Does not overcharge or discharge the battery

Prevents back feed thus protecting the battery

INBUILT MPPT CHARGE CONTROLLER



Working on the Perturb and Observe Algorithm, The MPPT achieves high levels of efficiency, (peak 96%)

ensuring that you get the most generation out of your solar panels.

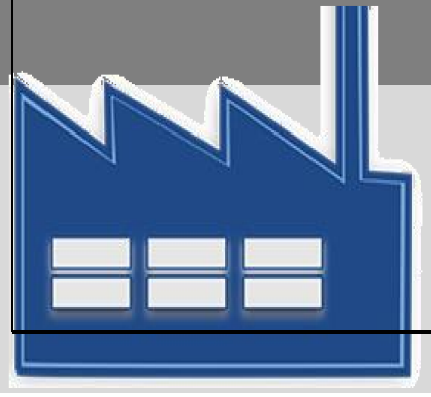
AVAILABLE IN MULTIPLE CAPACITIES

Statcon Energiaa's range of Off Grid Solar PCU comes in multiple capacities for all your renewable power needs. 1/2/3 kVA capacity for residences and small offices and 4/5/6 kVA for petrol pumps, larger offices, clinics, schools and more

PLUG N PLAY SYSTEM

Rewireable plugs (Male and Female) for AC Input and Load Output makes it very easy to install and commission at your Household or office.

INDUSTRIAL GRADE INVERTERS



Automatic Temperature Compensation to protect the battery from overheating

Can be charged via solar or grid separately

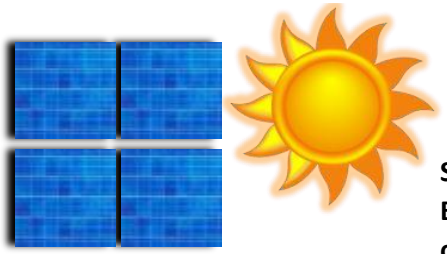
Pre programmed Values for VRLA, LMLA and Ni -Cd Battery Selection

With a life of 25 Years for Solar Panels and the recent push in Solar Energy provided by the Government, Solar is not only a green option but is a sound investment as well. It is indeed the right time to invest in solar, and contribute to Greener hom es and a Greener Earth

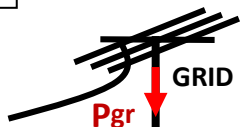
OFF GRID SOLAR POWER SYSTEM

Condition 1

Solar present, Grid available.
Battery Charged through Solar MPPT charger Only, Load supplied through Grid.



P so

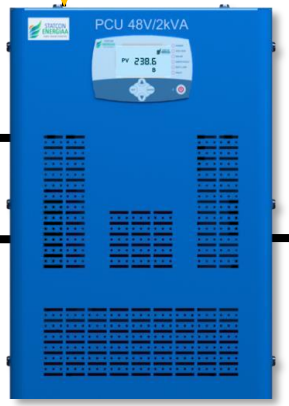


GRID

Pgr

INTERLOCK

DG SET
(OPTIONAL)



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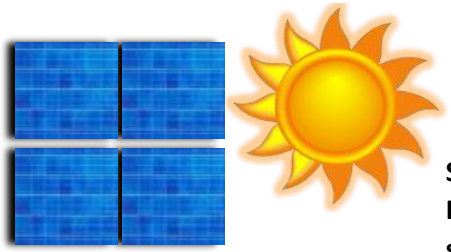
CHARGING

AC LOADS

AC LOADS

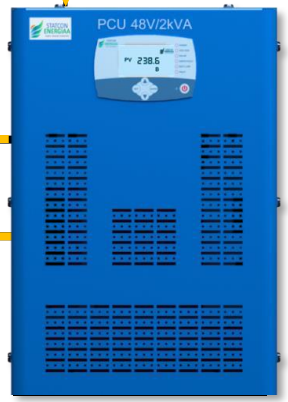
OFF GRID SOLAR POWER SYSTEM

Condition 2



Solar present, Grid available.
Battery Full Charged condition, Priority Load supplied only through Solar. Secondary Load Through Grid separately

P so



CHARGED

Pgr

GRID

INTERLOCK

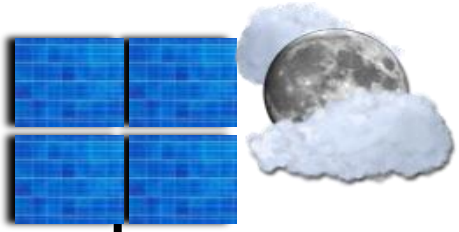
DG SET (OPTIONAL)

AC LOADS

AC LOADS

OFF GRID SOLAR POWER SYSTEM

Condition 3



Solar NOT present, Grid Available . Battery Charged through GRID, Load supplied through Grid.

INTERLOCK

DG SET (OPTIONAL)

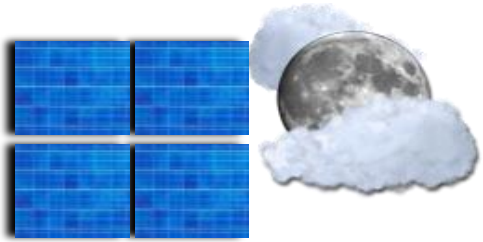
CHARGING

AC LOADS

AC LOADS

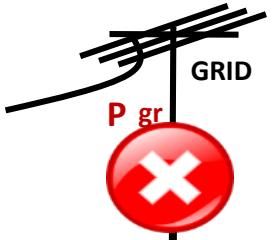
OFF GRID SOLAR POWER SYSTEM

Condition 4

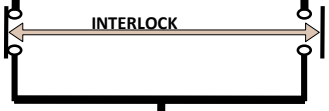


Solar NOT present, Grid NOT available .
Priority Load supplied through Battery.

No Interruption To LOAD during changeover!



DG SET (OPTIONAL)



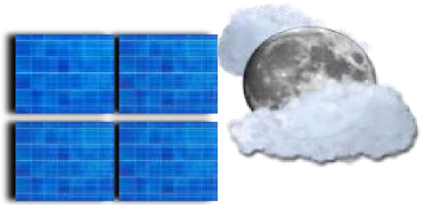
DISCHARGING

AC LOADS

AC LOADS

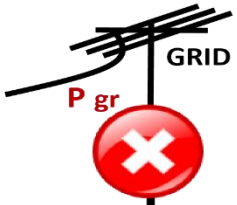
OFF GRID SOLAR POWER SYSTEM

Condition 5



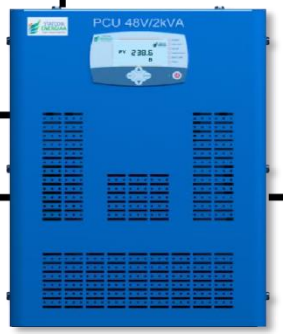
#5

Solar NOT present, Grid NOT available. Battery level lower than Pre-set then Charged through DG Set, All Load supplied through DG Set.



INTERLOCK

DG SET (OPTIONAL)



CHARGED

AC LOADS

AC LOADS

ADVANTAGES

1. Most trusted and long running technology for solar inverters.
2. Maintains the battery life by using solar to reduce its charging and discharging cycles compared to a non-solar inverter battery system.
3. Provides uninterrupted supply to the primary loads of the household.
4. Can run the loads from the available sources according to the priority of the sources in the algorithm.
5. Reduces diesel consumption by not running DG all the time.

DISADVANTAGES:

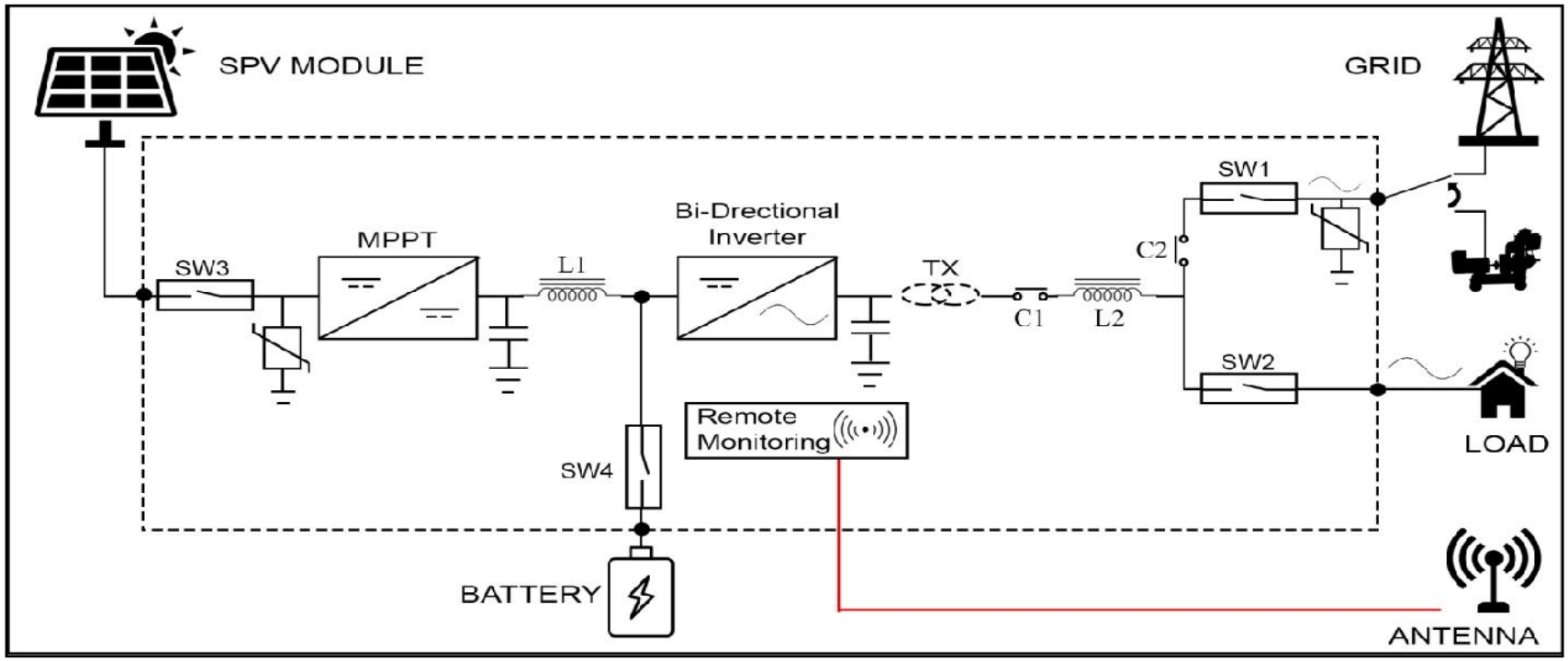
1. If the battery is already charged and the loads are few, then the excess power produced from the Solar panels is wasted.
2. Cannot export to grid.
3. No power sharing between sources. Different sources supply to different loads at the same time.
4. Battery life not as good (as Hybrid Inverters generally) and it dies out early.

HYBRID PCU

Smart storage Solar Inverters (referred as SSSI from now) are also known as HBD range Inverters. These machines are mechanically and electrically robust with a wide operating temperature range and hence suitable for operation in harsh environments. These machines are a perfect fit for low maintenance, off grid/ Hybrid installations of both industrial and residential nature.

A typical block diagram is shown below in Figure 1 involving the integration of SOLAR, GRID, BATTERY and GENSETS with the site loads. Inbuilt intelligence manages all the sources selectively to provide seamless power to the loads so as incur minimum bills with optimum utilization.

These HBD ranges of Inverters are available in both 1-phase and 3-phase versions under the series name of MONO-POWER and TRI-POWER respectively. MONO-POWER series has single phase systems ranging



from 3KW to 25 KW (@unity Pf) with same rating of MPPT charge controller in different battery voltage ranges. Similarly TRI POWER series has 3-Phase inverters ranging from 10 KW to 250 KW in different battery voltage (@unity Pf) with same rating of MPPT charge controller.

KEY ELEMENTS OF MACHINE:

MPPT BASED SOLAR CHARGE CONTROLLER

The unit has single/ multi MPPT based Solar Charge Controllers to convert PV power in to usable DC power as per battery & load requirements. The MPPT charger is buck type convertor such that PV voltage (under all circumstances) should be higher than the Maximum battery voltage. Hence the series-parallel arrangement of PV array is very critical for maximum power generation (discussed in separate section). The number of charge controllers depends on the rating of the system. Please refer the Appendix-8 & appendix- 9 for details.

BIDIRECTIONAL INVERTER

The heart of the system includes an Active Front End based Bi directional inverter which can perform AC-DC as well as DC-AC conversion and also synchronize with an AC source such as Grid or DG set. The convertor is capable of importing/exporting power from/the AC source depending upon the mode of operation. Its 4-quadrant design ensures highest level of customization to perform charge/discharge functions.

The Bi-directional convertor can act as an inverter under normal mode of operation such that it converts PV and Battery power into 240V/ 415V AC 50Hz supply for the connected loads. The same convertor acts as a grid charger to charge the batteries using grid supply whenever required.

In case of three phase systems, each phase is capable of delivering one-third power of the total inverter capacity. All the three phases have been designed for 100% power imbalance i.e. all the 3 phases need not be loaded equally for operation. This has been guaranteed using 3 independent circuits for the 3 phases and a 12 IGBT design which is perfect for imbalanced type of applications.

The inverter section has inbuilt galvanic isolation using power transformer of rated capacity which ensures rugged design under extremely fluctuating and impure grid conditions. It also provides a isolation between the DC and AC sides.

AUTO BYPASS ARRANGEMENT

Auto Bypass Feature is an integrated part of this system such that no extra semi-conductor device is required to perform this function. Being an Active Front End Convertor there is synchronization between Grid and Inverter Sine wave with a seam less transfer of power from inverter to grid with less than 5msec. of change over time. However Anti Islanding functionality from Grid has been achieved through an Anti-islanding Switchgear device as per IEC standards.

DISPLAY KEYPAD UNIT

Display keypad unit (DKU) is the single point of interaction between the user and inverter. It consists of a blue colored graphical LCD, 8 push button and 3 LED in form of sticker. DKU is used for settings change, parameter display, fault annunciation or any other indication with the machine

EMERGENCY STOP

The complete unit can be brought down to a dead stop through an overriding command just by pushing an easily accessible emergency switch. It deactivates both the AC as well as DC side circuitry as per the International norms of Safety of Electrical Equipment's. The switch can be found on the front side of all the units of more than 6KW capacity.

Remote Monitoring System (Optional)

HBD range of Inverters come with an option of remote monitoring system (RMS) depending upon the model chosen. For any inverter rating three types of models are available with the suffix C00, C01 or C02 depending upon the type of communication. C00 model does not have any external communication, C01 comes with inbuilt MODBUS over RS485 communication and C02 has GPRS based remote monitoring.

ESS (ENERGY STORAGE SYSTEM)

PRODUCT DESCRIPTION

The Off-Grid ESS are mechanically and electrically robust with a wide operating range and hence suitable for operating in harsh environments. This unit is perfectly fir for low maintenance for both industrial and residential nature.

A typical block diagram is shown in Figure 2.a involving the integration of SOLAR, GRID, BATTERY and GENSETS with the site loads. Inbuilt Intelligence manages all the sources selectively to provide seamless power to the loads so as to incur minimum bills with optimum utilization.

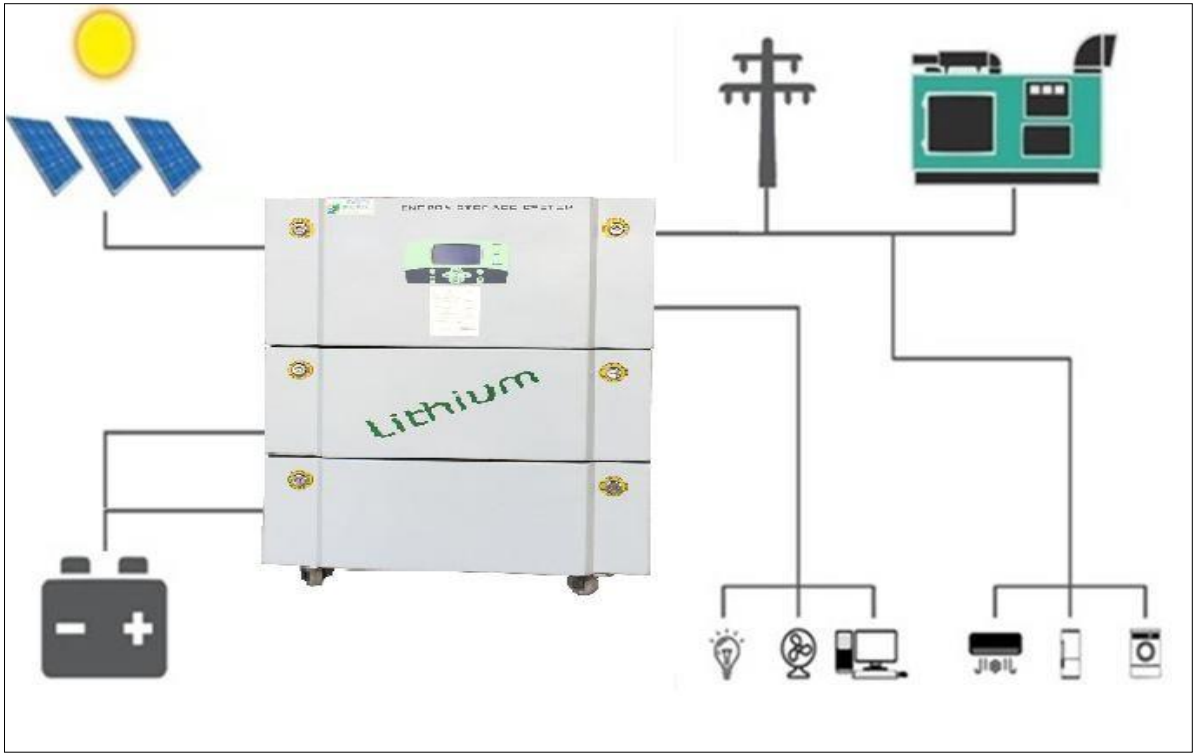


Figure 2.a **LAYOUT OF SOLAR INVERTER**

Thank you for being a part of the Indian solar revolution and buying a product that helps in sustainable development, guarantees peace of mind and perhaps more importantly cuts a major portion of your electricity bill. The solar Power Conditioning Unit (ESS) gives you the most savings through
Solar PV + Battery + Mains.

SCC (SOLAR CHARGE CONTROLLER)

MPPT For Railway Coaches

System Concept:

MPPT stands on Maximum Power Point Tracking .It extracts additional power from your PV array, under certain conditions.

The function of a MPPT is analogous to the transmission in a car. When the transmission is in the wrong gear, the wheels do not receive maximum power. That's because the engine is running either slower or faster than its ideal speed range. The purpose of the transmission is to couple the engine to the wheels, in a way that lets the engine run in a favourable speed range in spite of varying acceleration and terrain.

Let's compare a PV module to a car engine. Its voltage is analogous to engine speed. It's ideal voltage is that at which it can put out maximum power. This is called its maximum power point. (It's also called peak power voltage, abbreviated Vpp). Vpp varies with sunlight intensity and with solar cell temperature.

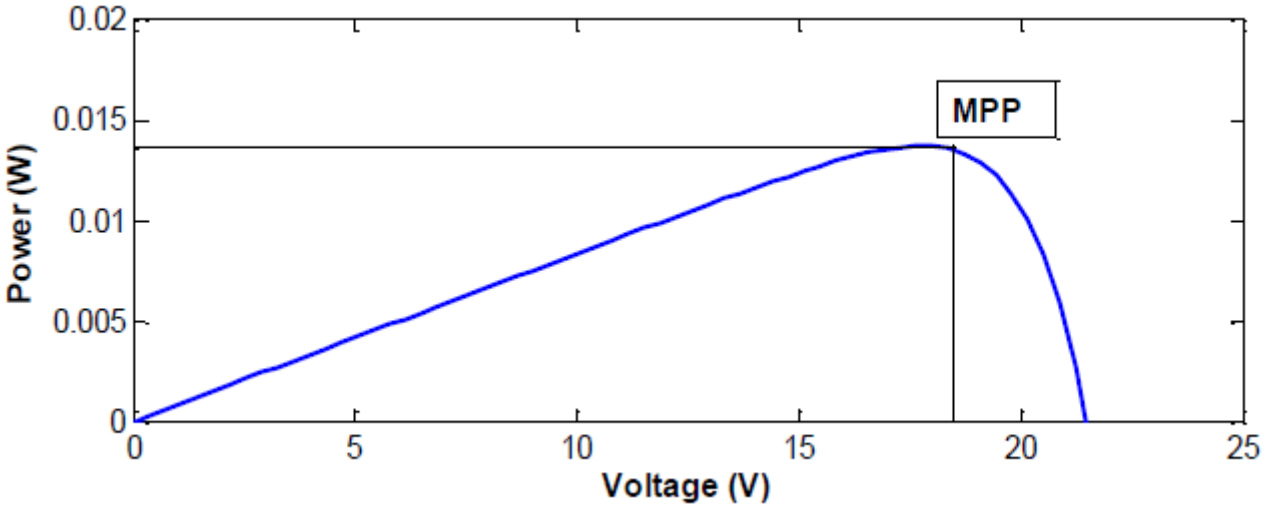
System Monitoring:

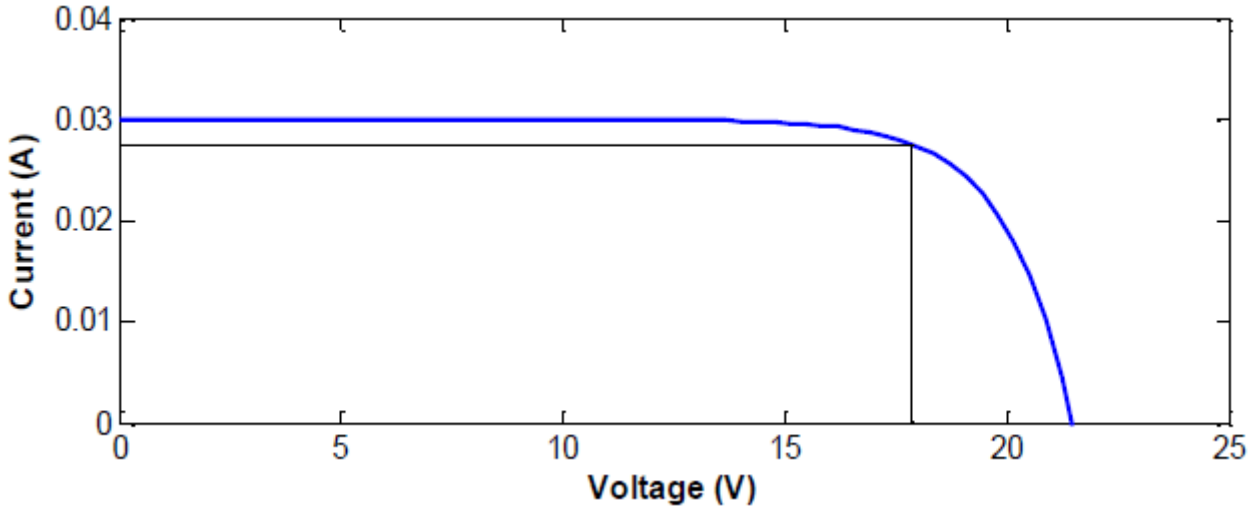
SCC has provision to connect radiation sensor, module surface temp sensor, ambient temp sensor, Vibration sensor for whether monitoring. Data of all sensors will be available for monitoring in data logger as well as remotely over GPRS.

All the relevant parameters of charge controller should be available for remote monitoring over internet using GPRS based monitoring solution.

Special Features:

- **ERRU/Auxiliary Power Supply**
  MPPT Solar Charge controller can be synchronized with coach existing ERRU or Auxiliary power supply
- **External Sensors Compatibility**
  Sensors like Radiation, Surface temperature, Wind, Ambient temperature, Humidity, Vibration can be connected
- **USB/SD-Card Storage**
  All parameters will be logged locally in Pen drive/ SD-cards
- **Web Base Monitoring**
  Generation and all other parameters can be remotely accessed through web-based software on PC/Laptop


0.02
0.015
0.01
0.005
0
Power (W)
MPP
0
5
10
15
20
25
Voltage (V)


0.04
0.03
0.02
0.01
0
Current (A)
0
5
10
15
20
25
Voltage (V)

PRODUCTS RANGES

The product range of the company varies from GPU (Ground Power Unit) for Indian Aircrafts to Automatic Cell Monitor, Thyristor controlled Rectifier Battery Charger, High Power Frequency Converter, High Current DC Regulated Supply, and Microcontroller based Battery Charger, Battery Cell Monitoring system and more. Brief description about some of the main manufacturing products of the company is given below:

Thyristor Controlled Float-Boost Charger

Built over glass epoxy board, the control circuit uses advanced Digital and Analog circuit blocks and suitable customisation is done for all special application of the customer. The special design feature of STATCON's charger is high transient response under specified load and line variation.

STATCON offers various charger configurations like Float cum-Boost Charger with dropper diodes, Dual Redundant Systems, Float and float Cum Boost Charger, Dual Float-cum-Float Boost Charger System and Multiple charger system with redundant (standby) charger etc.

❖ Integrated Power Supply

Integrated Power Supply is used for railway Signalling installations. Designed as per Railway Standards, consisting of SMPS type 110V/20A SMR Module,

DC-DC converter, Inverters, Ferro Resonant Stabilizers and Transformers etc. suitable for use with SSI, RRI, Panel Interlocking and level crossing applications.

❖ Battery Capacity Tester

It is designed to test Aircraft batteries. It finds application in other industrial segments, test houses too. It gives battery capacity in Ah.

Range: from 24V to 48V, up to 100Amps.

❖ Ground Power Unit (GPU)

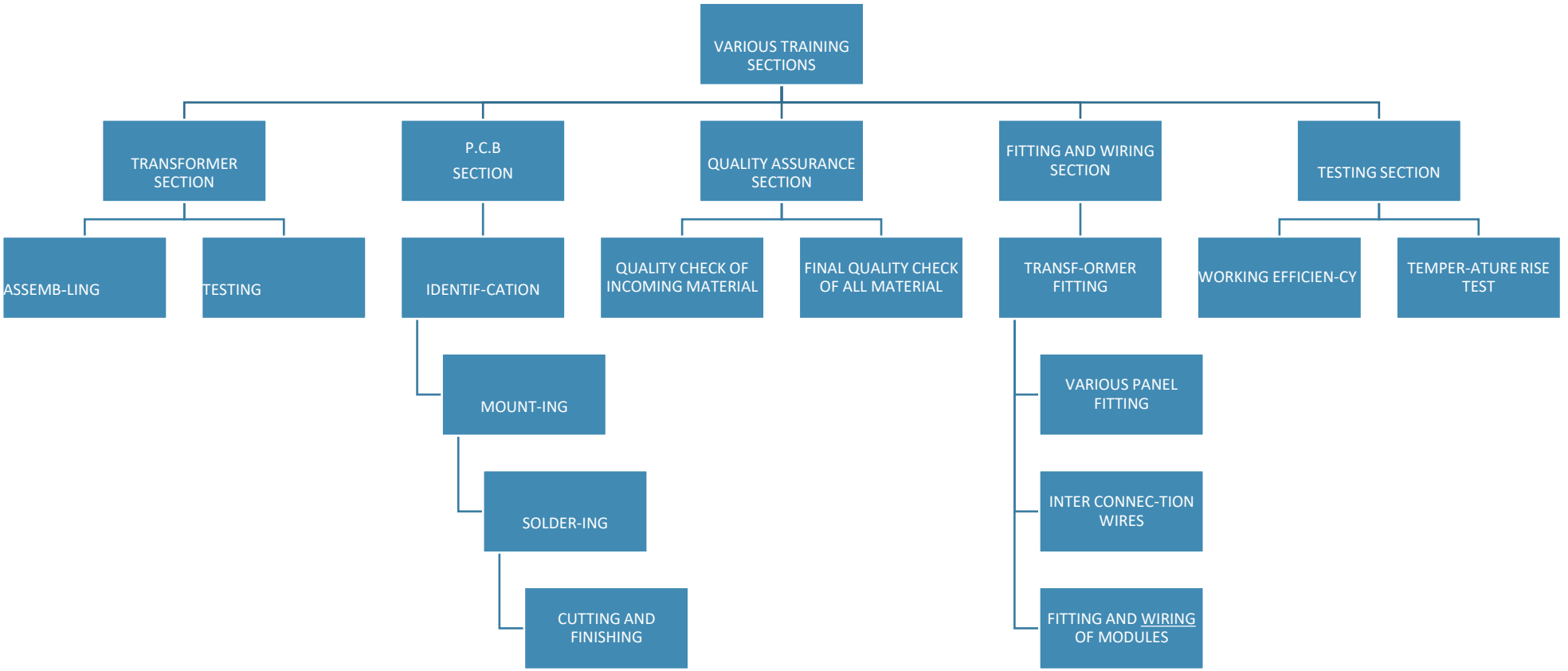
GPU is used for ground starting and maintenance of Aircrafts. It is self-propelled unit mounted on moving trolley and gives 400Hz AC as well as 28v DC (up to 1250 Amps). It is suitable for Russian and other aircrafts. GPU of other ratings and applications can also be supplied as per the requirements of defence commercial Aircrafts.

❖ Battery Management System

It is used to monitor the battery bank or any cell. It helps in remote monitoring of cell and can detect a faulty cell before the whole bank fails to deliver. It can be used for remote monitoring in telecom, Railways, UPS, or Power application Batteries

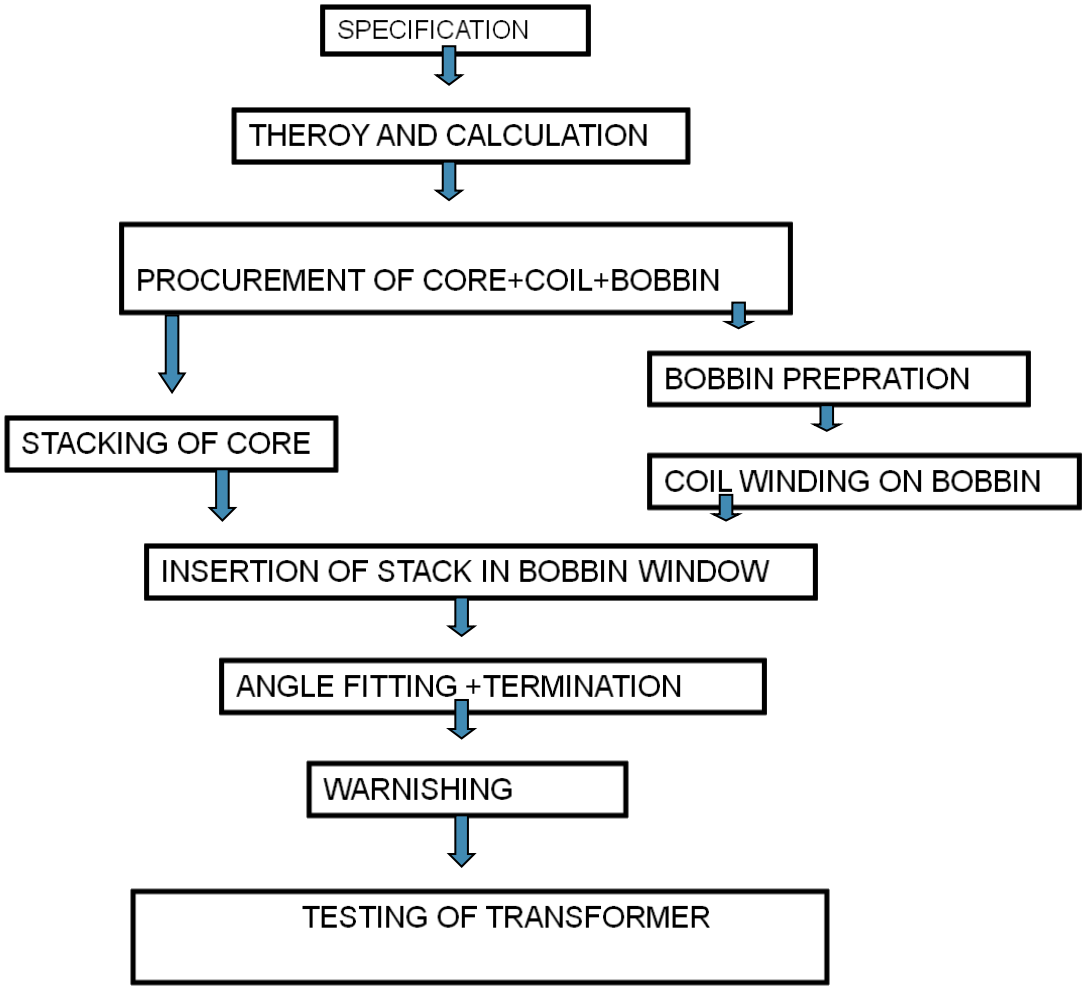
Various Training Sections

Various sections in which company provides not only practical but also beneficial training to the trainees regarding various components used and their practical applications are described below with the help of a chart.



Power Transformer Section:

Transformers are an integral part of any Power Sector company. The complete procedure of developing any transformer includes the following steps:



Testing of Transformer:-

Before the transformer is put to use we perform the following tests on the transformer

1. **No Load Current :-**

   The primary and secondary connection should be correct, for humming which is due to loose core (can be removed by varnished) in no loaded condition, the current on the primary side provide only core or iron loss, there is no current at the secondary winding. No load current should be small. It is energising current, this is effectively 'lost' power, power used in the transformer to energise the core. A transformer hums due the magnetic field produced in the iron core causing the core material and the winding to vibrate at 120 Hz. When transformer operates at 60Hz, the magnetic field is also switched causing the magnetic field in the winds to change direction. This rapid change in the magnetic field causes a vibration in the core and winding causes bee like hum (Magnetostriction).

   Reasons for humming are;

   - Insulation is deteriorating.
   - Loose terminals
   - Nor rubber fitting installed
   - Overloading / unbalanced loading

2. **High Voltage :-**

   If the voltage is increased to a very high value, if the transformer can with stand that high voltage or not, insulation is not damaged between the coils and core (copper insulation). This test determines whether coil is touching core or secondary windings to primary windings.

3. **Coil resistance :-**

At a particular specified standard of SWG, what should be the resistance at the different range of temperature? This test is valuable in preventing unplugged outages and premature failure.

4. **Ratio Test :-**

   To check the transformer has right ratio corresponding on its rated voltage in primary and secondary windings.

5. **Meggar Test :-**

   This test is used to check the moisture between the input and output, earth and input, earth and output. This test has different rating for different cards.

6. **Short Circuit Test :-**

   This test is used to check the transformer impendence. Short circuit test is used to make sure you don't have direct connections between two nodes that need some resistance between them.

7. **Temperature Rise Test :-**

   This test is performed only on new designs. This test is used to determine the maximum temperature that the transformer can withstand.

8. **Double Voltage Double Frequency Test:-**This test is performed only on new design. Due to over voltage or short circuit, there is sometime excess voltage or frequency in the lines that may damage the transformer. So this test is used to determine the maximum frequency and voltage the transformer can withstand.

Quality Assurance Department

The quality assurance department ensures that a product or service being produced and delivered is meeting specified requirements before, during and after its delivery. In a manufacturing unit it performs various duties. In Statcon the various responsibilities of this department are as under.

Responsibilities:

- To receive the material from gate section.
- Conduct incoming inspection of raw material, piece-parts and products & keep the records.
- To evaluate the vendor's performance based on IQC report of material & maintain the records.
- In-house calibration of test & measuring Equipments used in testing / production process & maintain the records.
- Maintain Internal /External Calibration record of testing Equipments.
- Control of non-confirming products (during incoming inspection).
- Conduct Mechanical QC at the time of fabrication and after testing Final Electrical & Mechanical QC of Equipments.
- Update Vendor approvals and Vendor list.

Authority:

- To initiate, implement and verify corrective actions about problems related to non-conformity of material.
- To take decision regarding quality of incoming material.
- To check calibration status of Equipments which are used by testing/servicing personnel's.

Pcb Assembly & Testing

PCB assembly is mazor section among all manufacturing facilities

- Thosands of components like capacitor,resistance,diodes etc are assembled on PCB and this assembly is called as CARD.
- In PCB section different card of circuit like DC-DC inverter, PFC card, Inverter SMPS card are assembled which are used in manufacturing of IPS

An assembled PCB : CARD used in IPS

Steps involved in PCB assembly and testing:

- PCB Mounting
- PCB Soldering

- Final Touch up
- Testing of PCB

PCB Mounting:

PCB of different cards are printed according to design passed by R & D dept .There is a BOM (Bill of Material) for every PCB. Components on PCB are mounted according to bill of material of that perticular PCB.

PCB Mounting Desk

Mounting of PCB is done on Mounting Desk where all the components which are to be used in mouting are placed. All the components are already checked by Quality Check Dept.

Steps in Mounting are:

- First receive a bared PCB and bill of material of perticular card.
- Calculate the values of resistances and capacitors from bill of material and get all from mounting desk.
- Mount axial components like resistances and diode first.
- After mounting axail components, mount radial components like capacitors and transistors.
- At this stage don’t mount very sensitive components like MOSFET etc because they can burn from high temperature during dip soldering proccess. And apply tap at same place to protect from soldering.

Mounted PCB:CAR

Solder Bath

Channel

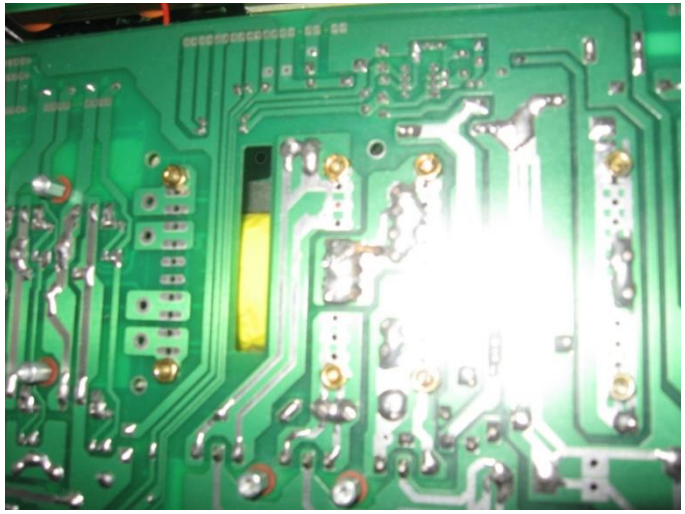
PCB Soldering:

After mounting cards are taken to soldering chamber for soldering:

- Soldering of cards is done by Dip Solder Machine.
- Dip solder has three parts:
    1. Solder Bath
    2. Channel
    3. Compressor
- Compressor is used to adjust the pressure.
- In solder Bath ,heated liquid solder is kept to solder the cards.Solder Bath
- Channel is used to apply the mixture of 50% flux & 50% thinner on cards before soldering.

Procedure For DipSoldering:

- Switch on the solder bath and set temperature at 240’C.
- Allow solder to melt.
- Temperature should be: 240 deg(April to Octobet) and 250 deg(November to March)
- Switch on Compressor.
- Switch on fluxer heater.
- Adjust pressure for flux bubbles.
  Measure temperature of net of fluxer at 3 point for 1 minute. It should be 180’C.
- Pass PCB mounted in the channel through flux bubble so that all components leads must dip inside flux.
- Allow flux to dry up for approximatly 15 seconds and put it on fluxer heater.
- Set automatic dip time to 2 seconds for single side and 3 seconds for double sided PCB.



Card after dip

Cards after final touch up

Final Touch up of PCB:

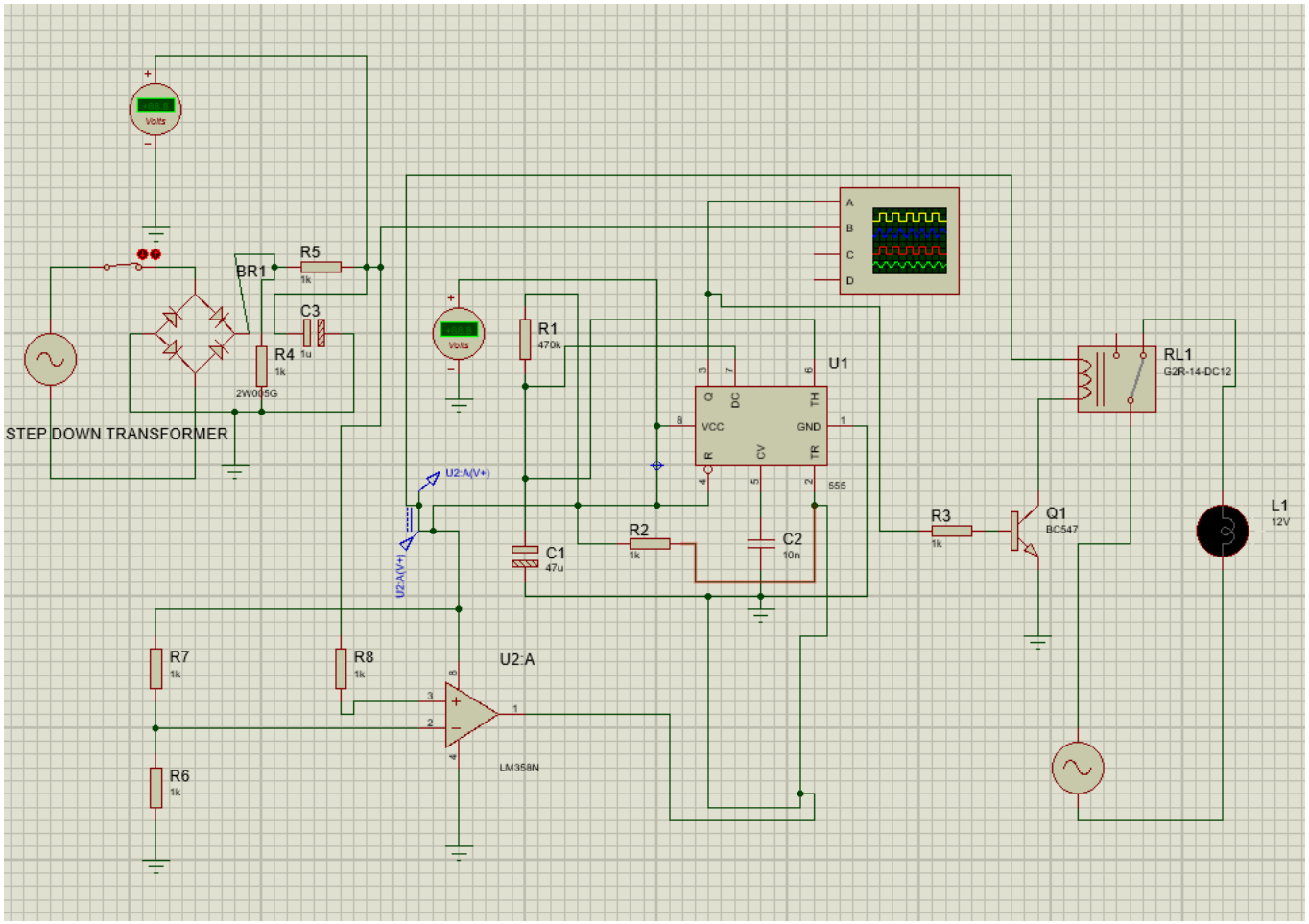
- After getting cards from store,remove all the taps.
- Mount all remaining components on card.
- Solder these components with hand soldering machine.
- Cut extra lead of all components with cutter.
- Check the card for dry soldering .
- Final visual inspection with the help of bill of material.

USERS / CLIENTS

Ever since the company's philosophy of personal participation and commitment to total customer's satisfaction, through innovation, quality and sound business plan, the company is today positioned and as being a preferred supplier to a wide spectrum of customer base, like

- Indian Railways
- State Electricity Board
- Thermal Power Station
- Hydro Electric Power
- Telecommunication
- Indian Air Force
- Indian Army
- Indian Navy
- Aviation Research Centre
- Hindustan Aeronautics Ltd., Nasik
- Indian Ordinance Factory
- Border Security Force
- Jaiprakash Group
- Defence
- Siemens
- Exide
- Alstom
- B.H.E.L
- N.T.P.C
- N.H.P.C
- L & T
- FIBCOM
- I.T.I
- ABB
- P.G.C.I.L
- VA-TECH

PROJECT : TDR



- What is TDR?

Time delay relays control the flow of electrical power and can be used to control power to many different types of electrical loads.

- Where are Timing Relays Used

Timing Relays are used extensively in industrial applications, HVAC systems and building services to provide time-delayed switching. For example to start a motor, control an electrical load, or simply automate an action. They play a vital role for targeted logic needs.

A common example you have probably seen is in a corridor or stairwell which is infrequently used. Perhaps in a place of work, or an apartment block. We don’t want the light to stay on constantly, we want it to automatically turn off. So once the light switch is pressed, the time delay relay keeps the light on for a certain amount of time. Once this time expires, it automatically cuts the power to the light.

- Why do we need it in our circuit?

In case of power cut, when the mains is supply is cut and the household devices get disconnected from the supply of electricity, the standard domestic inverters in our our houses supply the electricity and most of the devices are able to function normally. But in case of some air conditioning units, when the mains is disconnected and the current is started to be drawn from inverter batteries, they draw a huge amount of current from the batteries and hence damaging the appliance.

Thus to solve this we need to put a time delay so that this phenomenon can be controlled and our inverter battery along with the air conditioner is safe.

- Solution

We solve this problem by using a time delay relay circuit so that a sufficient amount of time delay can be set up and the A.C unit works and gets connected only after that short delay.

- Introduction

The 555 IC was designed in 1971 by Hans Camenzind under contract to SigNetics Corporation.

• Basically, 555 timer is a highly stable circuit used to generate time delays, or Oscillations.

• A single 555 timer can provide time delay ranging from microseconds to hours.

• It operates from a wide range of power supplies ranging from + 5 Volts to +18 Volts supply voltage.

The function of each pin of the IC is given below

- Ground
- Trigger
- Output
- Reset Pin-5: Control Voltage
- Threshold
- Discharge
- Vcc

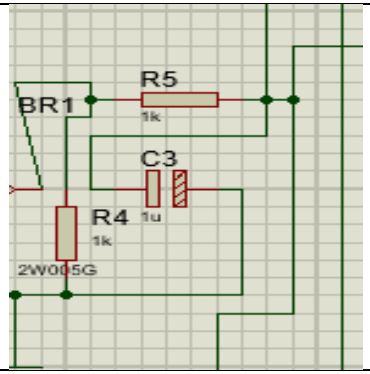
- Modes of Operation

555 IC Timer applications can be classified into two main categories:

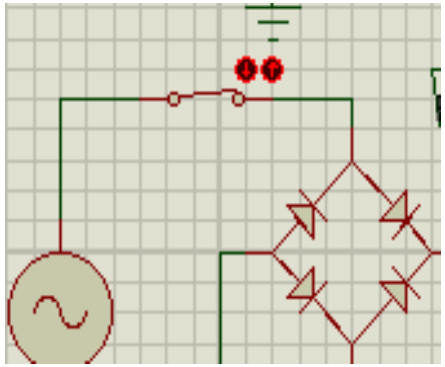
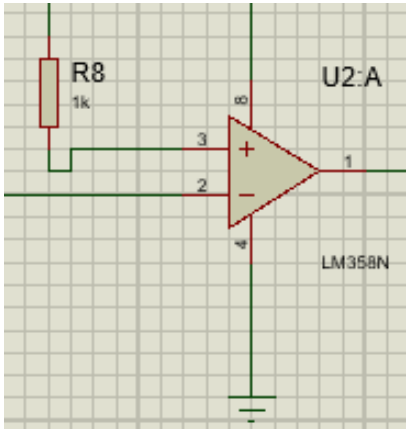
1. Monostable Multivibrators:- Producing a single pulse when triggered.

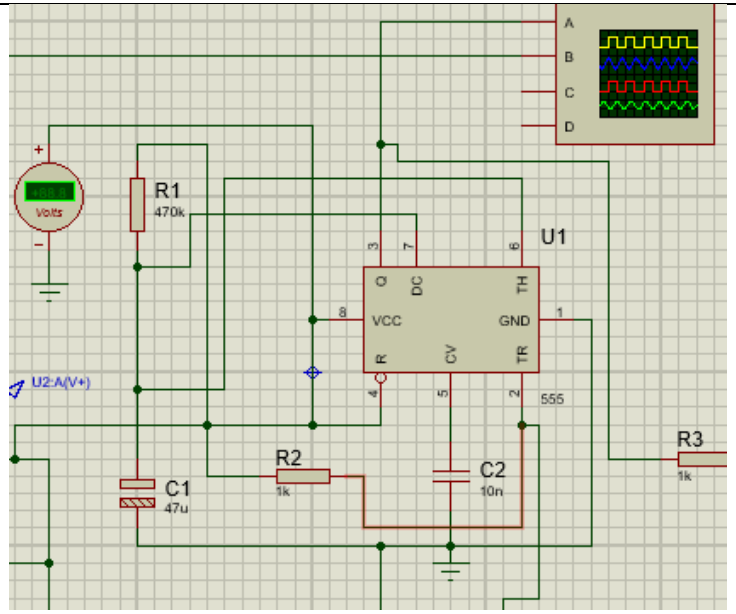
2. Astable Multivibrators.:- Producing a square wave.

WORKING OF TDR



• LOW POWER FILTER

	• SWITCH TO CONNECT AND DISCONNECT AC SOURCE FROM CIRCUIT
	OPAMP • IT IS USED AS COMPARATOR RESISTOR 7(R7) AND RESISTOR 6 (R6) USED TO SET REFERANCE VOLTAGE TO COMPARATOR *IT WORK AS A POTENTIAL DIVIDER



• USING U1(NE555) TIMER IC

AS MONOSTABLEVIBRATOR

CASE 1 (ON SWITCH)

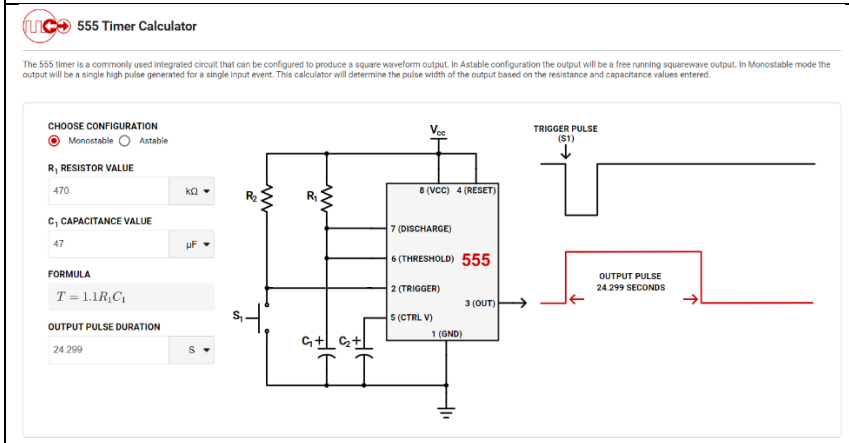
OUTPUT OF THE COMPARATOR IC

PIN 1 WILL BE 12 VOLTS

CASE 2(OFF SWITCH)

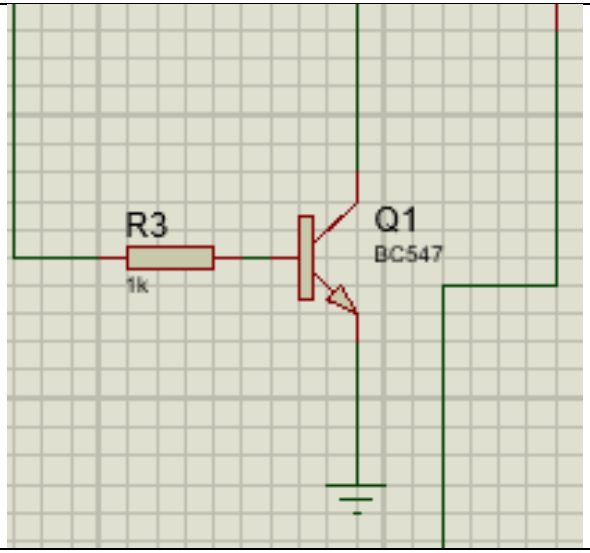
OUTPOT OF THE COMPARATOR IC PIN 1 WILL BE LOW

•IN THIS WAY IT ACT AS TRIGGER

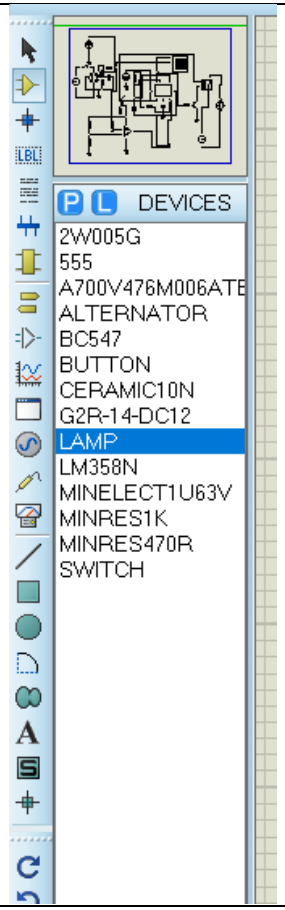


IN THE SELECTED RESISTOR (R1) AND CAPACITOR(C1) VARIES SUCH THAT THE TIME IC GENRATES 24.3 SECOUND DELAY

THIS DELAY APPERS ON PIN 3 OF 555 TIMER IC WHICH IS CONNECTED TO THE BASE BIPOLAR TRANSISTOR BC-547



•TRANSISTOR D1 IS USED TO DRIVE THE 12 VOLTS RELAY
THE BASE DRIVE OF TRANSISTOR IS CONTROLLED BY OUPUT PIN OF TIMER 555 IC PIN 3
RELAY RL1 USED TO RUN/STOP THE AIR CONDITION (L1)



COMPONENT USED

555 Timer Calculator

The 555 timer is a commonly used integrated circuit that can be configured to produce a square waveform output. In Astable configuration the output will be a free running squarewave output. In Monostable mode the output will be a single high pulse generated for a single input event. This calculator will determine the pulse width of the output based on the resistance and capacitance values entered.

CHOOSE CONFIGURATION

(•) Monostable ( ) Astable

R_1 RESISTOR VALUE

470 kΩ

C_1 CAPACITANCE VALUE

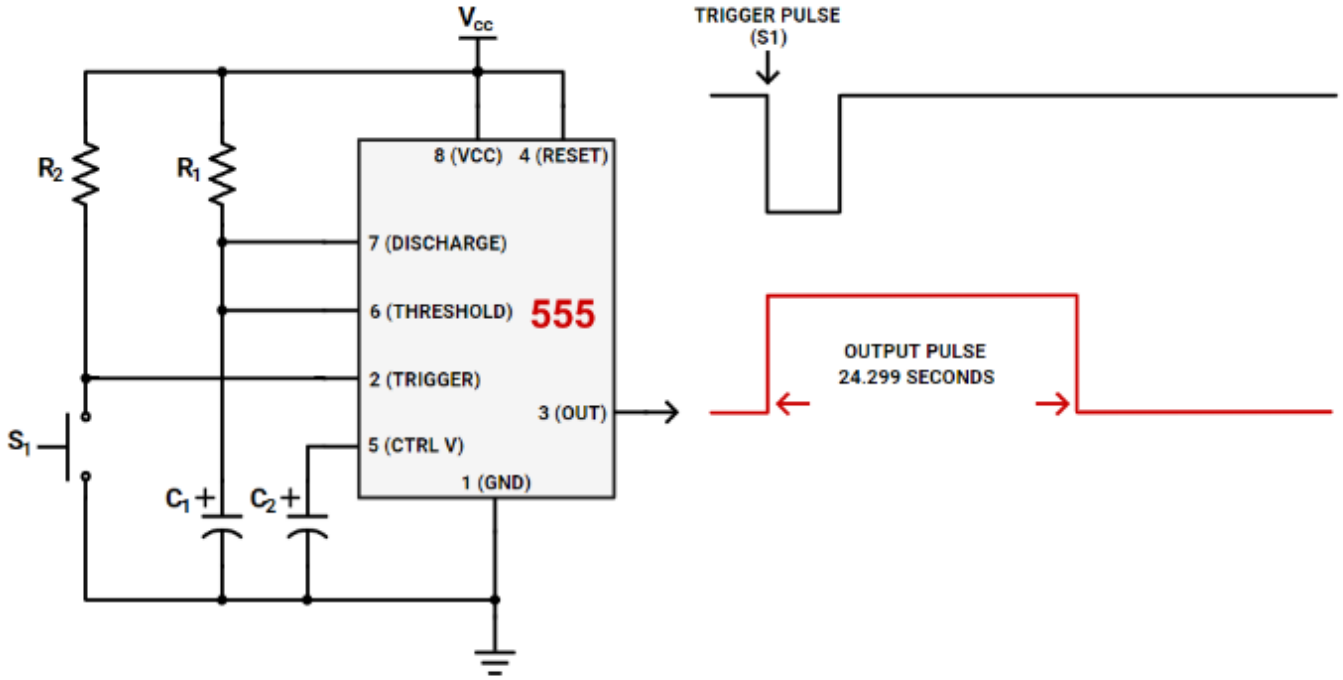
47 µF

FORMULA

$$T = 1.1 R_1 C_1$$

OUTPUT PULSE DURATION

24.299 S



CONCLUSION

Each day, during my training period, was a step closer towards perfecting my knowledge in the field of power electronics. The motivation for the main task stemmed from the continued miniaturization of computer and other electronic equipment, which has created a demand for the development of ever smaller, lighter and more efficient switching power supplies.

My broad objective was to keep close links with local power electronics based industries to carry out advanced research in power electronics, of direct relevance to industries.

There were a few obvious inferences which reinforced my knowledge base. Power electronics is interdisciplinary in nature and is used in a wide variety of industries from computers to chemical plants to rolling mills. The importance of power electronics has grown over the years due to several factors. Smart power devices are expected to become ubiquitous and revolutionize the way power is handled. Based on my basic knowledge of power electronics, it is at the confluence of three fundamental technical areas - power, electronics and control.