METAL OXIDE SEMICONDUCTOR FIELD EFFECT TRANSISTOR

BASED INVERTER WITH

BATTERY

- **GENERAL INTRODUCTION**

Currently whatever work one does, in each and every Field one need to use some electrical or electronic device to carry out his/her job and this electrical or electronic device- require electricity to carry out their work. In a developing

Country like outs power ·cuts and power line problems are very frequent. This situation gets worse in sue specific such as in summer and rainy season when these problems become a common thing.

During the power cut if one needs to use any electrical/ electronic appliance such ,-)s fan light bulb etc. then some kind of device which could provide power to these appliances becomes essential. Inverter is one of most commonly used device for this purpose.

“An inverter is device which can convert the DC supply of battery into AC power supply required by most of the electrical/ electronic equipment”’

The process though which these inverters converter DC in to AC supply is called "inversion". This inversion process is reverse of the rectification process where the AC power is converted into DC power.

, Inverter is the most sophisticated solid state 1C based fully automatic little electric generator) It converts DC power into50Hz regulated 230V AC power from battery. In case of power failure, it switches on automatically to supply

power to load and when mains supply is restored, it switches off automatically and battery charger take over which charges battery to next power failure.

- **SEMICONDUCTORS**

UPS is a power electronic device. Various semiconductor components are used in the system. Before we study UPS, it is essential to be clear about the base semiconductor components used in the system. Some of the semiconductor devices that are widely used in the system are listed below:

1. Transistor
2. Thyristor
3. MOSFET
4. IGBT

Let us discuss each of the above semiconductor devices below.

- **BASIC OF INVERTER**

DISCRETION:

Circuit to understand the working Principle is shown in Figure Battery Switch and a Transformer with centre trapping are connected as shown. Initially the switch is in position B.

When Switch is on current flows through the upper half of the winding of the transformer. Flux is Produced the core in one direction, emf is induced in the secondary and load current flows in one direction.

When Switch is broight quickly to position C, current flows through the bottom half of the winding, flux is produce in the opposite direction. Emf is induced in the secondary winding in the opposite direction and load current flows in the opposite. Actually SCR or transistor is used in place of switch.

PRINCIPALE OF INVERTER:

Inverters Converts DC Power into AC Power at The Required Voltage Frequency BJT, MOSFET LGBT<MCT or SCR can be used for making inverter circuit. For reduced Current Rating Device Other Than SCK is used. While for greater rating SCRs are used-Output wave form of SCR may be sinusoidal or non sinuirement For more Power Inverter with low distortion sine wave are used-frequency of the output wave is decided by the on and off time of the device

Input Source of inverter may be battery, soler cell or other DC source. In most of the industrial application, first AC is converted into DC using rectifier. This is filtered and that DC is used to drive inverter. Output voltage of signal phase inverter is 220V, 50Hz or 120V, 60Hz or 220/380V, 115/200V, 400Hz, The output volteg and frequency may be after than this also depending upon the requirement.

- **CHAPTER4 BLOCK DIAGRAM OF MOSFET BASE INVERTER**

Connect the car battery to the circuit using crocodile clips. The red clip should be connected to the positive terminal of the battery & the black clip should be connected to the Negative terminal of the battery. If crocodile clip should be connected to the wrong terminals of the battery LED glows to alert you.

MOSFET BASE INVERTER WITH CHARGE

This MOSFET base power inverter is capable of generating approximately 35oyb power) the inverter provides enough power up to 350W if we use car battery 8s it is fully charged. For the testing purpose you can use any 12V 7 Ah (or more) battery. Output is 230Vac 50Hz.
As seen from the block diagram this inverter consists following stages. Power supply, charger ckt. For the 12V 7Ah battery, Oscillator circuit, divider circuit, battery low ckt. Power amplifier Inverter transformer.

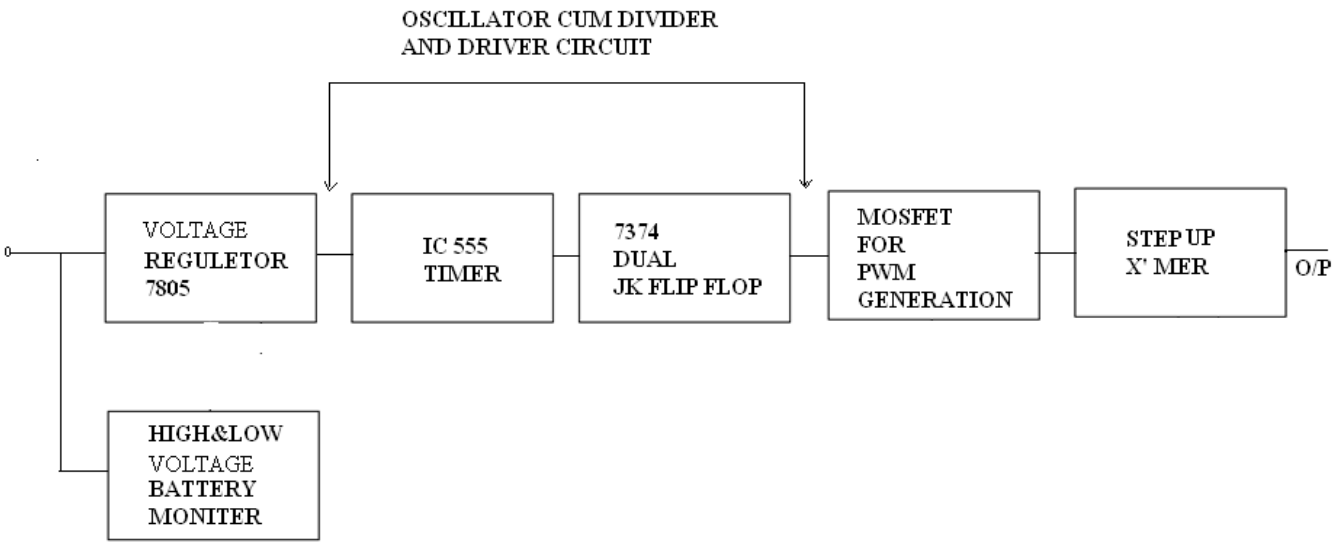
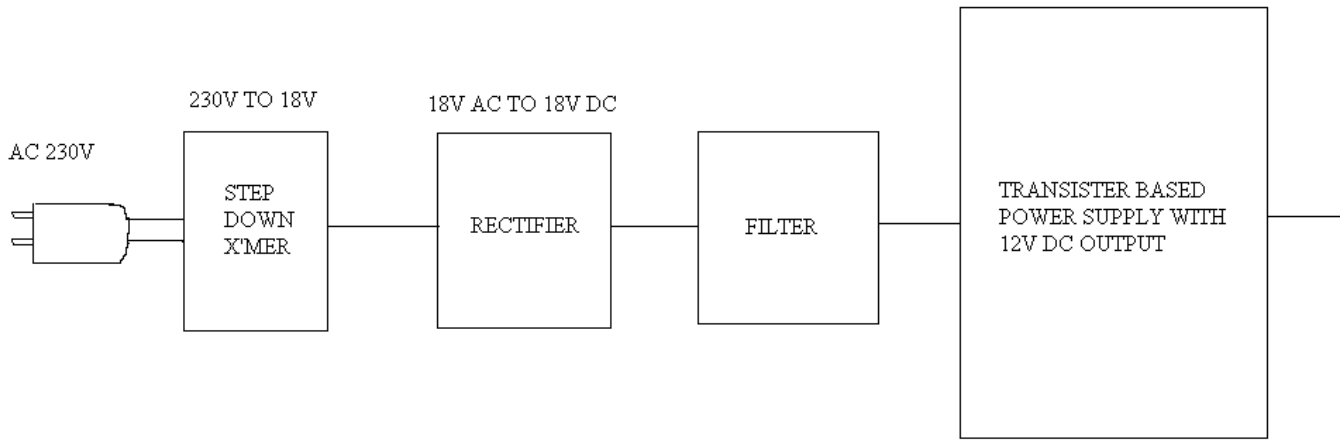


FIG: 4.1 BLOCK DIAGRAM OF MOSFET BASE INVERTER



SUPPLY SYSTEM OR CIRCUIT

FIG-4.2 BLOCK DIAGRAM OF MOSFET BASE INVERTER

- **BLOCK DIAGRAM OF MOSFET BASE INVERTER**

Connect the car battery to the circuit using crocodile clips. The red clip should be connected to the positive terminal of the battery &, the black clip should be connected to the negative terminal of the battery. If crocodile clip are connected to the wrong terminals of the battery LED glows to alert you.

Now switch on the unit. LED glows to indicate power is on & 12V DC reaches regulator 1C 7805. Tile regulated output is fed to the oscillator- cum-divider and driver while the center terminal of the inverter transformer primary is connected to the positive terminal of the battery. Capacitor Cal functions as a reservoir capacitor.

- **Low battery indicator:-** For long life of the battery, it

Should not be allowed to discharge to a voltage below 10V. Even a single event of deep discharge can reduce the charge-holding capacity of the battery permanently, for audio -visual indication of the low-battery level, a LM741 1C is used. A fixed reference voltage of 5. IV is applied to its inverting pin of the 1C. While the sensing voltage is applied to its non-inverting input. Set preset P1 such that the piezobuzzer sounds when the on-load battery voltage fails below 10V.

When the battery voltage drops below 10V, the sense input voltage drops below 5.1V and output pin 6 of the op amp 1C goes high to sound the buzzer and light up LED.

- **Oscillator-Cum.-Divider:-**

The oscillator-cum-divider section is built around timer 1C LM555 and dual J-K flip-flop IC 7473. Only one flip-flop of the dual J-K- flip-flop is used here. Timer 1C LM555 is wired as an as table multivibrator. Whose time period is decided by resistors R7 and RS and capacitor C5. It produces 100Hz at output pin 3. Which is given to the pin no 5 of 1C 7473. This 1C will produce 50 Hz with 50% duty cycle. When the inverter is switched ON 1C2 starts producing 100 Hz, while the J- K flip-flop produces 50 Hz at its output pin 8 &, 9. The output of the timer 1C2 can be checked using the oscilloscope at pin no. 3.

- **Driver circuit:-**

The flip-flop output is fed to MOSFET driver transistors Ti 86 T2 via a diode-transistor network. At any instant, if the voltage of pin no. 8 of IC3 is +5 V, the voltage at its pin no. 9 will be OV, and vice versa. Therefore when transistor Ti conducts, transistor T2 is cut off and vies versa Whenever output pin 8 of IC3Goes high, NPN transistor Ti conducts and the corresponding set of MOSFETs (T3-T5) remains cut off while the collector of transistor T2 is at 5V. Thus the current flows through half of the inverter transformer's primary winding. Similarly, when output pin no 9 of IC3 goes high, npn transistor T2 conducts and the corresponding set of MOSFETs {T6-T8)

remains cut off while the collector of transistor Ti is at 5V.Thus current flows through the inverter transformer's primary winding.

- **Power amplifier:-**

The power amplifier section comprises two
Sets of three power MOSFETs connected in parallel for operation of the inverter. The output of IC3 drives the MOSFETs via transistors Ti 86 T2 to generate 5011z, 230V AC at the output of inverter transformer XI

- **Fabrication:-**You call _3_ssemble the circuit on given P.C.B. However, an actual-size PCB for the medium-power inverter circuit is shown. Piaf configuration of MOSFET IRFZ44, regulator IC 7805 and npn transistor BD139 are given. After construction, enclose the entire circuit in any portable box. Use separate heal sinks for each MOSFET set Construction, enclose the entire circuit in any portable box. Use separate heat sinks for each MOSFET set

ADVANTAGE OF PWIVI INVERTER OVER OTHER CONVENTTONAL INVERTER;-

- It can operate on low level power signal with economically.
- It is less expensive as compared to other inverter for small power Application.
- It reduces the circuit size.
- The other conventional inverter e have running and moving parts so they

  Have higher losses where as in PWM inverter running and

  Moving

  Part so power consumption is less.
- Power MOSFER has high speed turn on and turn off capacity so

  Compare to other inverter.
- It is more reliable
- The efficiency is high about 90%

APPLICATION

- ✓ In home, shops, office, hospitals, cinemas etc.
- ✓ It is used to run electrical or electronics devise such as FAN, TV, VCR, TUBE, & BULB etc.

General application of an inverter

In industry application such as

- ✓ Variable Speed AC moter drive
- ✓ In U.P.S. (Un interruptible Power Supply)
- ✓ Air Craft Power Supplies

INVERTER

- **RESISTORS:-**

R1, R3, R9		--- 1.2KΩ	-- Brown Red Red Golden
R2.121.2, TO R 16		---- 1K2Ω	
R6, R8		--- 330Ω	
R7		---- IΩ / 1W	
R4	----	560Ω	
R5	----	1.0KΩ	
R11	----	15KΩ	
R10	----	220Ω	
PI	----	50KΩ Horizontal Preset	

- **CAPACITORS:-**

Cl, C2, C3	0.1µF-104 -
C4	100 µF/25V
C5	0.47 µF/63V
C6	0.01 µF/25V
C7	1000 µF/25V

- **SEMECONDUCTOR:-**

D1, D4	---- 5.1V Zener diode
D2, D3	---- IN4148
D5, D6, D7, D8	---- IN4007
Q1, Q4	---- BC547
Q2, Q3	---- BD 139
TI TO T6	---- IRFZ44
IC1	---- 7805
UI	---- LM741
U2	---- NE555
U3	---- 74LS73
L2, L5	---- Red KED
L4	---- Yellow LED
L1	---- Green LED
RL1	---- 12 V, 200Q I CO Relay
S1	---- on/off Switch
Transformer	:- 0-12V,1A for battery charging

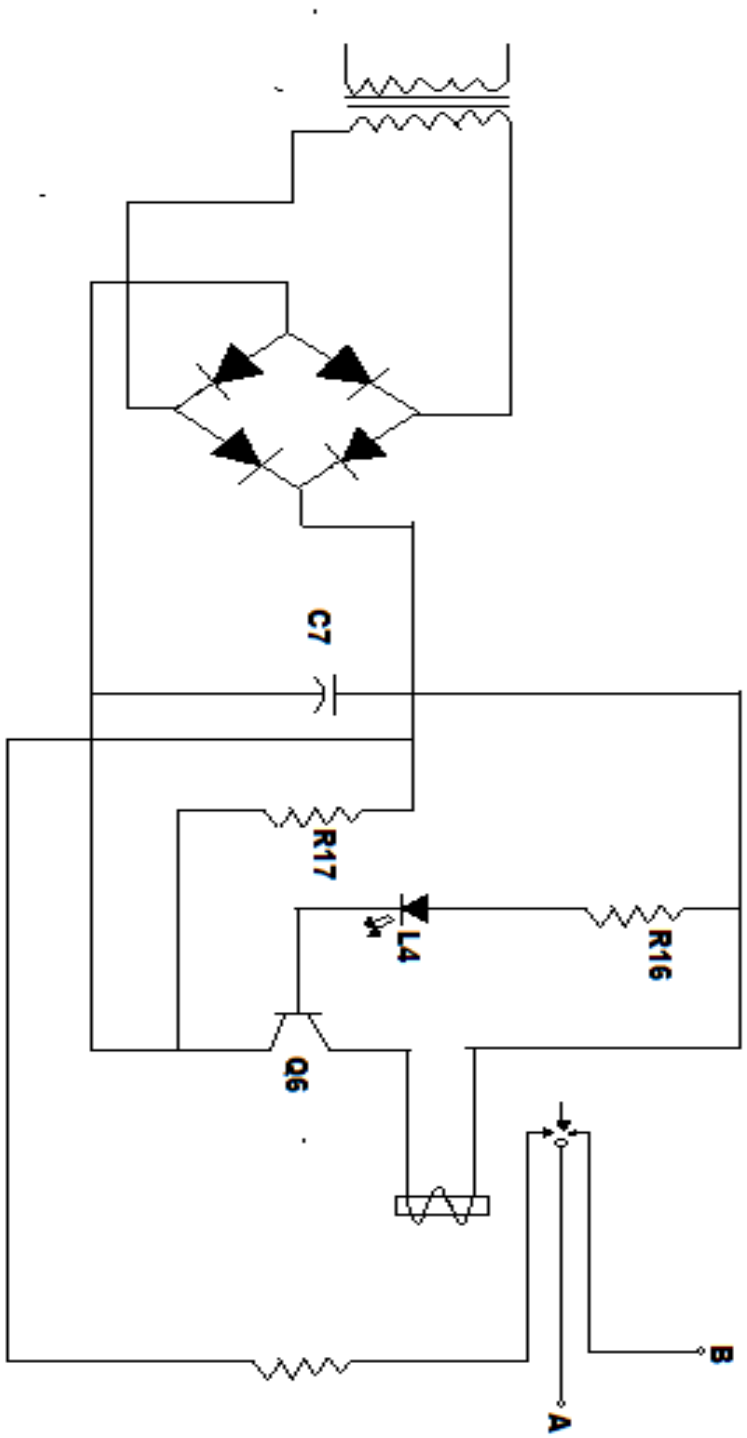


Fig :7.1 Supply system or circuit

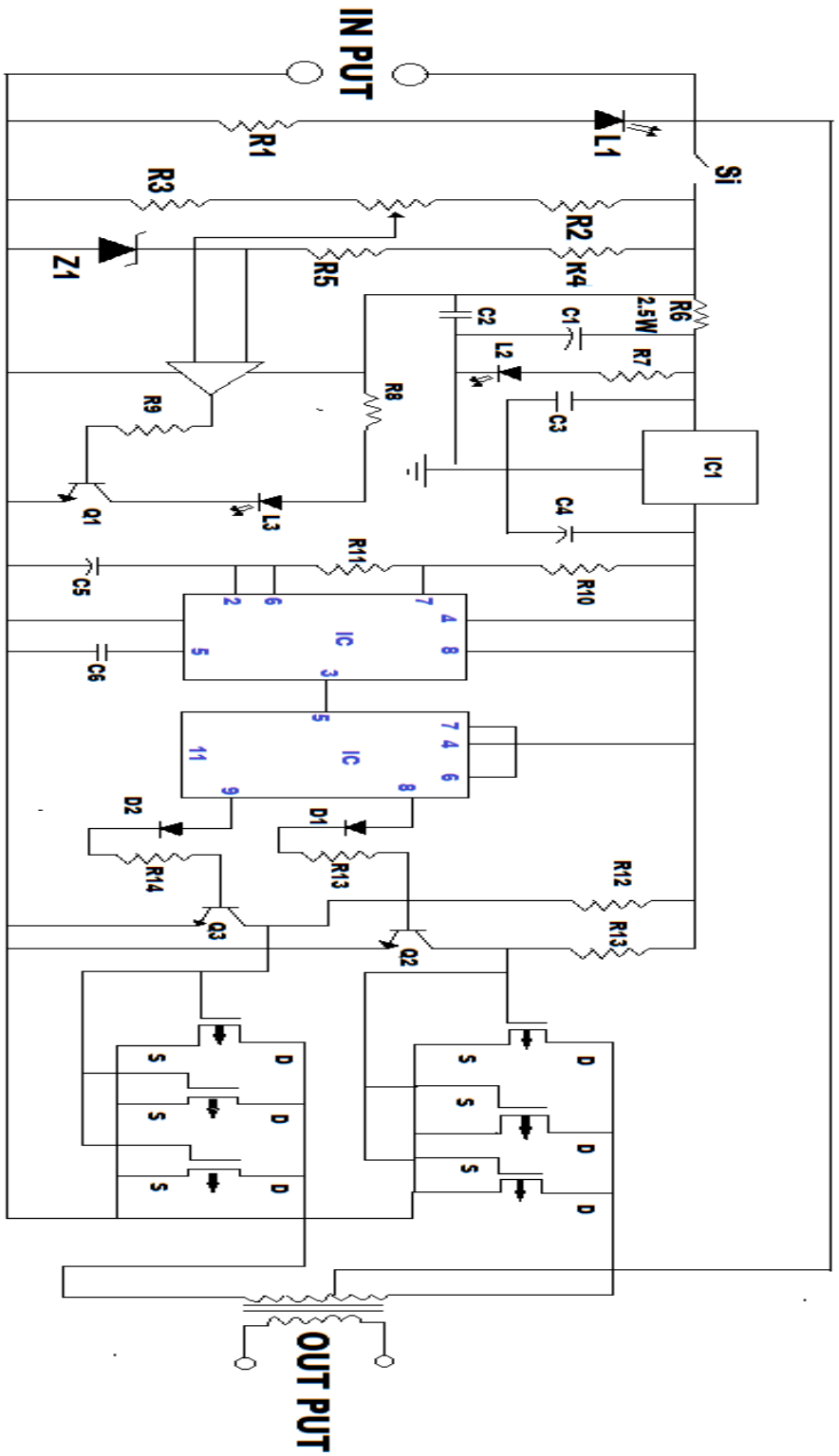


FIG-7.2 MOSFET BASED INVERTER

➢ REFERENCE:

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- Electronic for you magazine