

Gemini Communication Ltd.

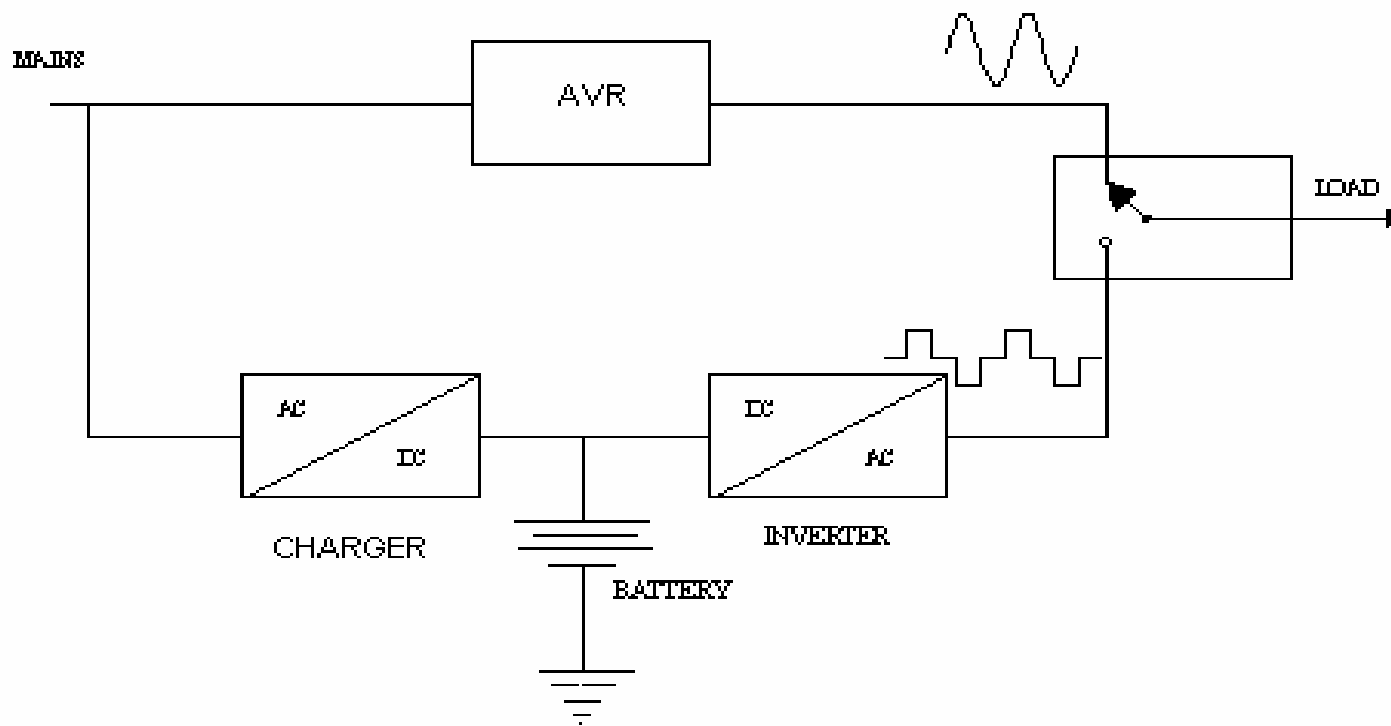
Training Manual *UPS*

Basic concepts

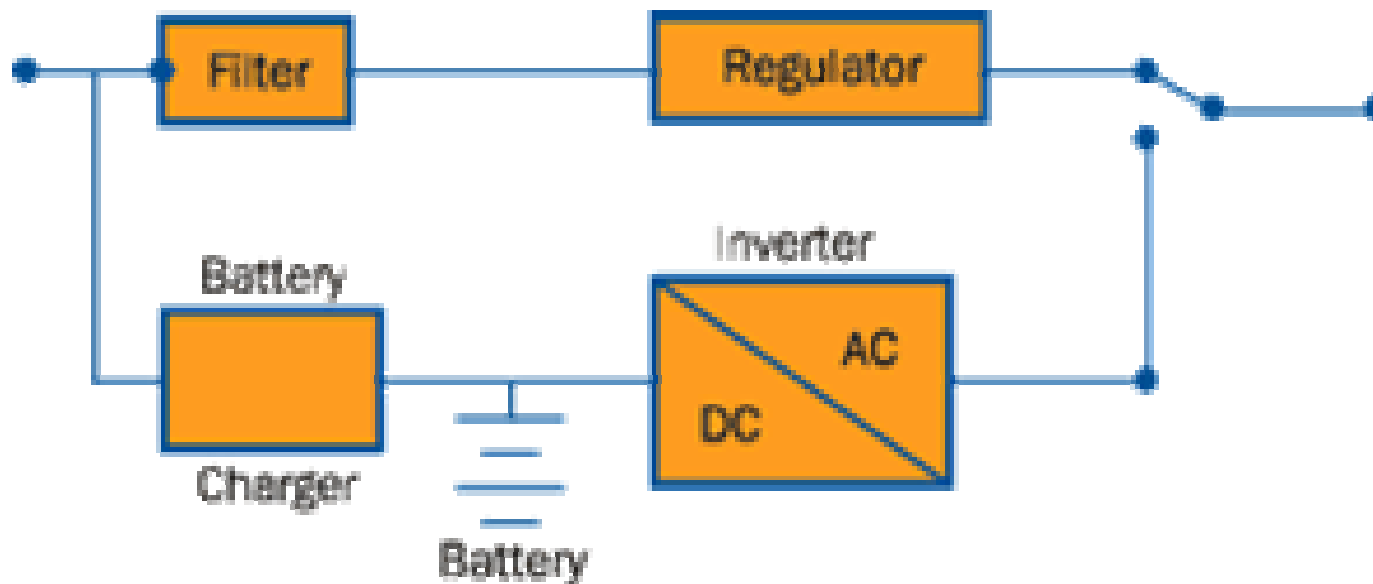
Based on Frontline UPS

- THREE BASIC TOPOLOGIES GOVERN THE UPS MARKET
- OFFLINE UPS
- LINE INTERACTIVE UPS
- ONLINE UPS

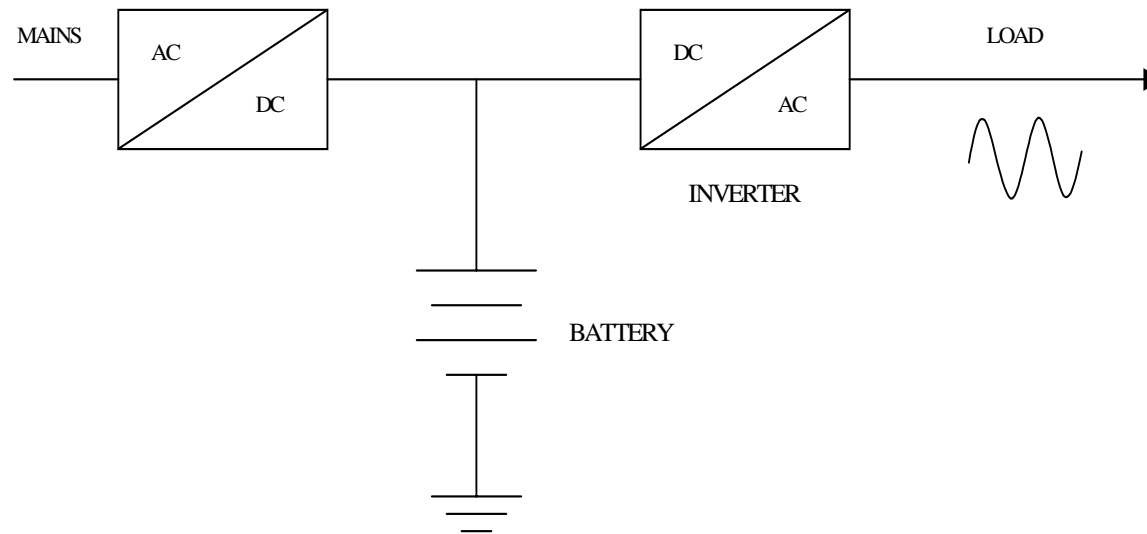
BLOCK DIAGRAM OF OFFLINE UPS SYSTEM



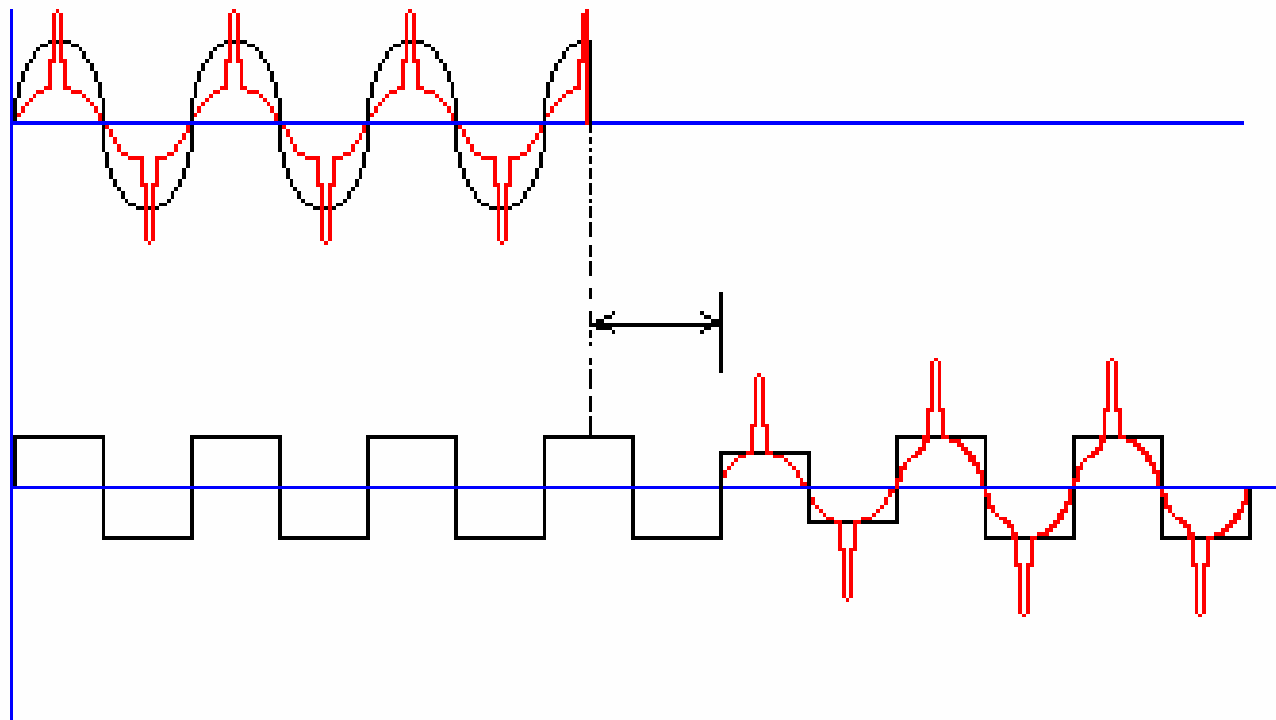
BLOCK DIAGRAM OF LINE INTERACTIVE UPS



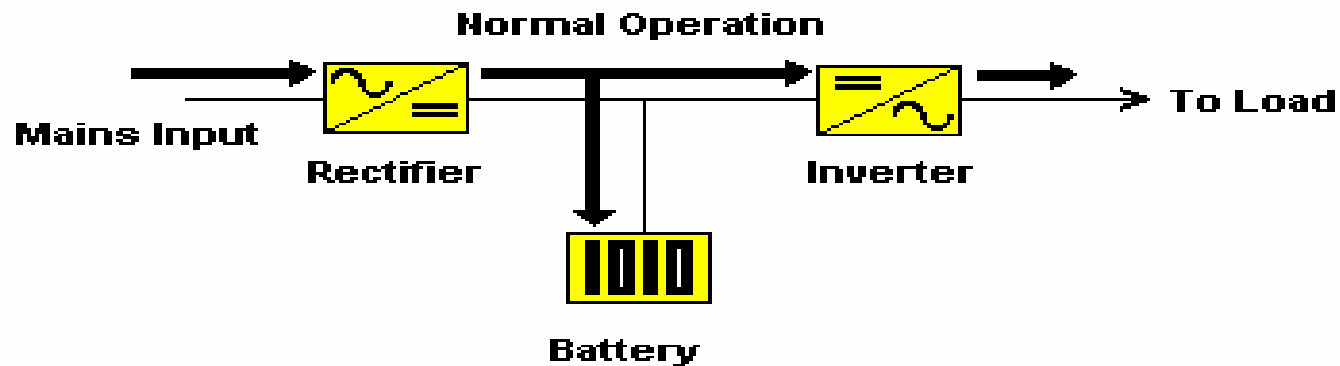
BLOCK DIAGRAM OF ONLINE UPS SYSTEM



LOAD TRANSFER ON OFFLINE UPS SYSTEM

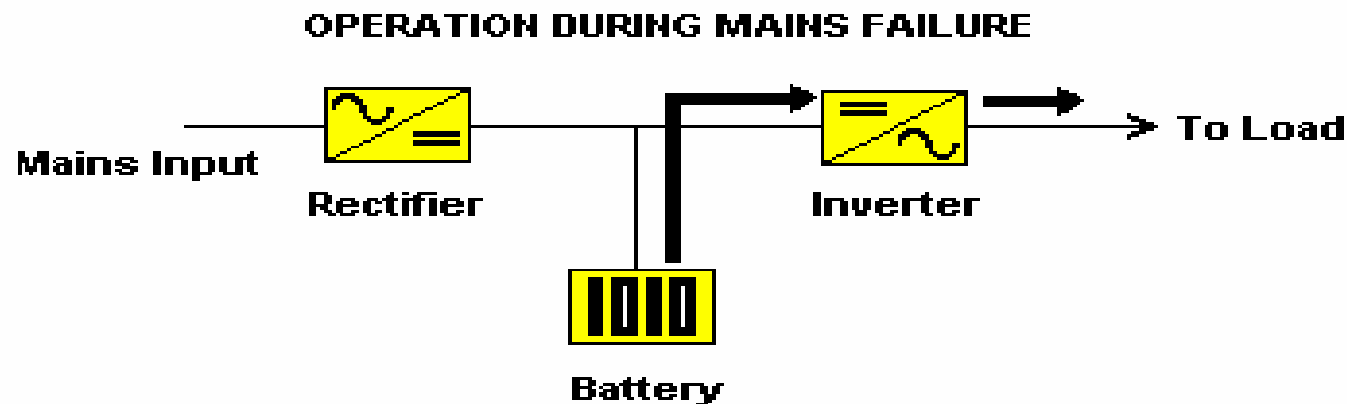


ONLINE UPS SYSTEM NORMAL OPERATION



- RECTIFIER CONVERTS AC TO DC AND CHARGES BATTERY
- INVERTER CONVERTS DC TO AC
- LOAD IS SUPPLIED BY INVERTER

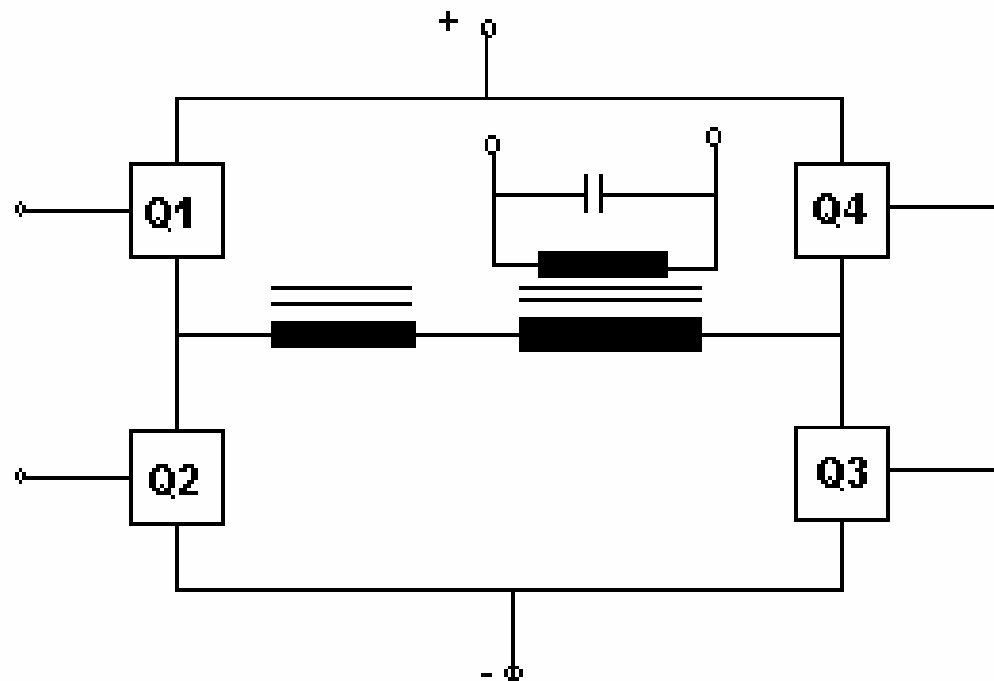
ONLINE UPS – DURING BATTERY MODE OPERATION



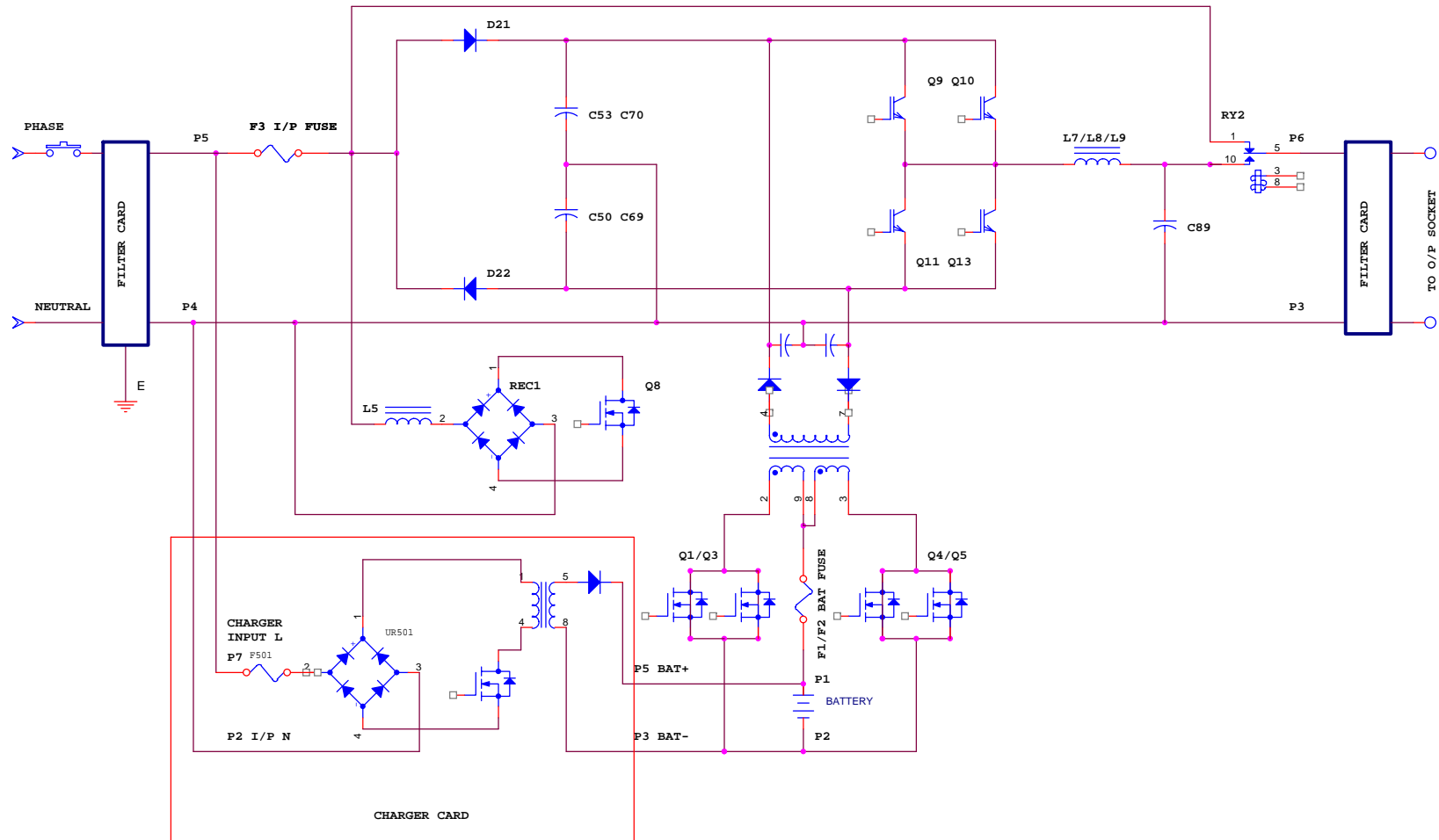
- DC POWER IS SUPPLIED FROM BATTERY
- INVERTER CONVERTS TO AC
- LOAD IS SUPPLIE BY INVERTER

- **POWER DISRUPTIONS COULD BE:**
- **VOLTAGE VARIATIONS**
- **NOISE**
- **SURGES**
- **SPIKES**
- **SAGS**
- **WAVEFORM DISRUPTIONS**
- **BROWNOUTS**
- **BLACKOUTS**
- **FREQUENCY VARIATIONS (MAINLY CAUSED BY GENERATORS)**

TYPICAL INVERTER BRIDGE CIRCUIT



Q1, Q2, Q3 & Q4 ARE MOSFETS/POWER MODULES/IGBT'S

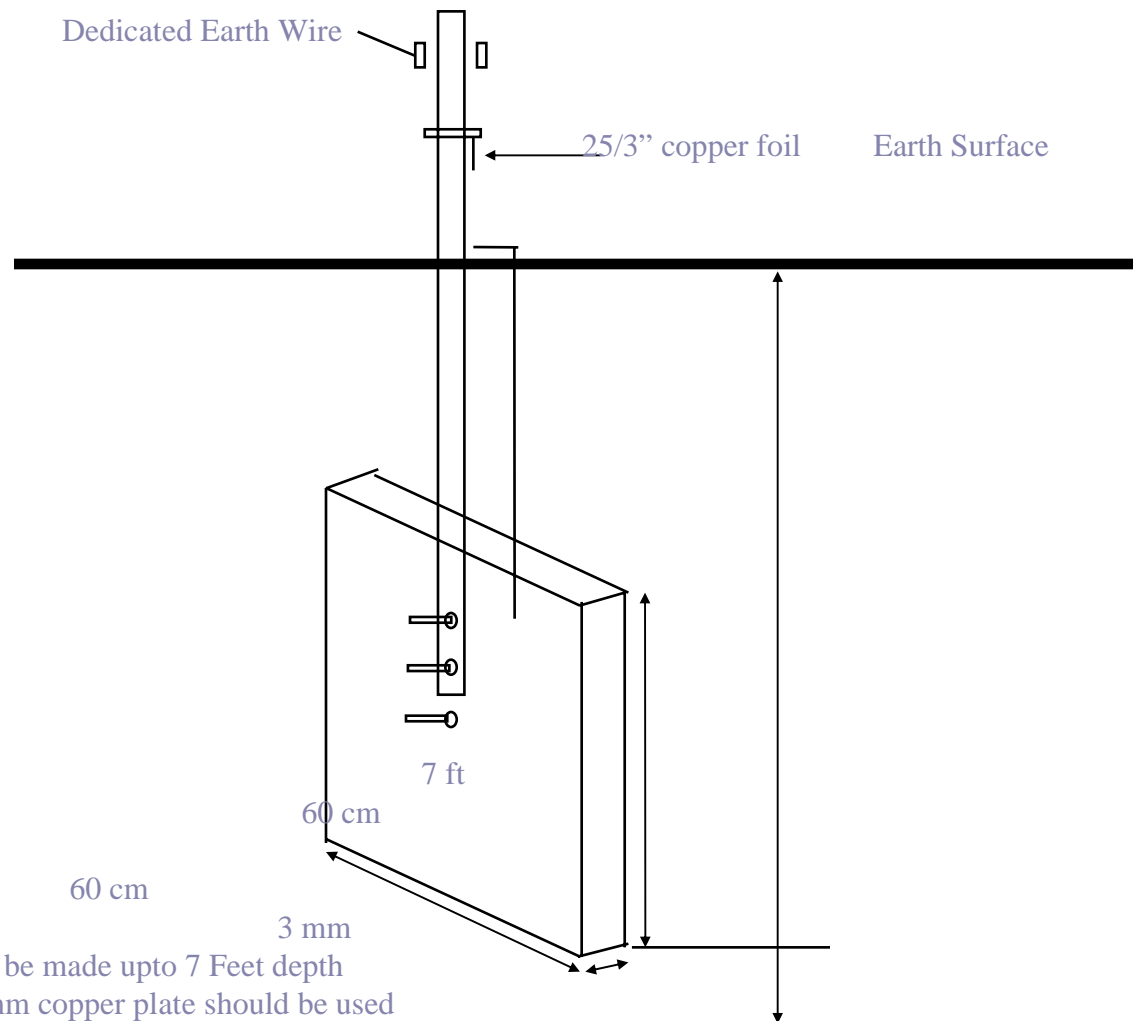






Dedicated Earthing Specifications





Pipe diameter 40 mm



1. 1.3 x 3 Feet pit should be made upto 7 Feet depth
2. 60 cm x 60 cm x 3 mm copper plate should be used
3. Pit should be filled by salt (25 kgs), coal (25 kgs) and sand
4. Earthing resistance must be less than 3 ohms



OVERLOAD TRIP.

-  DUE TO OVER LOAD CONNECTED TO THE UPS.
-  O/P SHORT CIRCUIT
-  SWITCHING DEVICE / CIRCUIT FAILURE
-  O/P EARTH OPEN AT LOAD POINT.

BATTERY LOW TRIP

* **BATTERIES COMPLETELY DRAINED AND WITH THE FAILURE OF MAINS SUPPLY**

* **CHARGER FAILURE - DC VOLTAGE IS JUST THE BATTERY VOLTAGE**

NORMAL VOL	-	2V
CHARGING VOL	-	2.2V

ie. For 120V SYSTEM

ON BATTERY MODE	-	123V OR LESS
ON CHARING MODE	-	135 V OR MORE

* **TRIPING AS SOON AS POWER FAILS - BATTERY DEFECTIVE**

* **BATTERY LOOSE CONNECTION**

* **IMPROPER INPUT VOLTAGE - PHASE SEQUENCE FAILURE.**

OUTPUT UV/ OV

- * STEP LOAD VARIATION**
- * FEEDBACK FAILURE IN THE CONTROL CIRCUIT.**

OVER TEMPERATURE

- * **EXHAUST FAN FAILURE**
- * **CONTINUOUS OVERLOAD**
- * **INADEQUATE VENTILATION ARRANGEMENTS.**

PROBLEM	CAUSE	EFFECT	REMEDY
BATTERY LOW TRIP	Due to frequency and voltage variation with the variation of load in Genset.	Frequent Mains failure alarm.	Check the Genset
	Phase Sequence Failure	Although all three phases are available, charger does not work indicating mains failure.	Ensure phase sequence is maintained all the time.
	Inadequate Genset ratings.	Frequent mains failure alarm	Always provide Genset, double the capacity of UPS.
OVERCHARGE TRIP	Change over switch loose connection Improper Neutral wire	Charger will not function and system will trip on battery low.	Ensure regular preventive maintenance in Genset, Switches and Cable connections.

ENHANCE YOUR BACK-UP TIME.

**WHILE THE EQUIPMENT RUNS ON
BATTERY MODE**

- **SWITCH OFF THE UNUSED LOADS
WHICH WILL REDUCE THE LOAD ON
INVERTOR, ENHANCING THE BACK-UP
TIME.**

DO'S AND DON'T'S WITH "Frontline" UPS SYSTEM

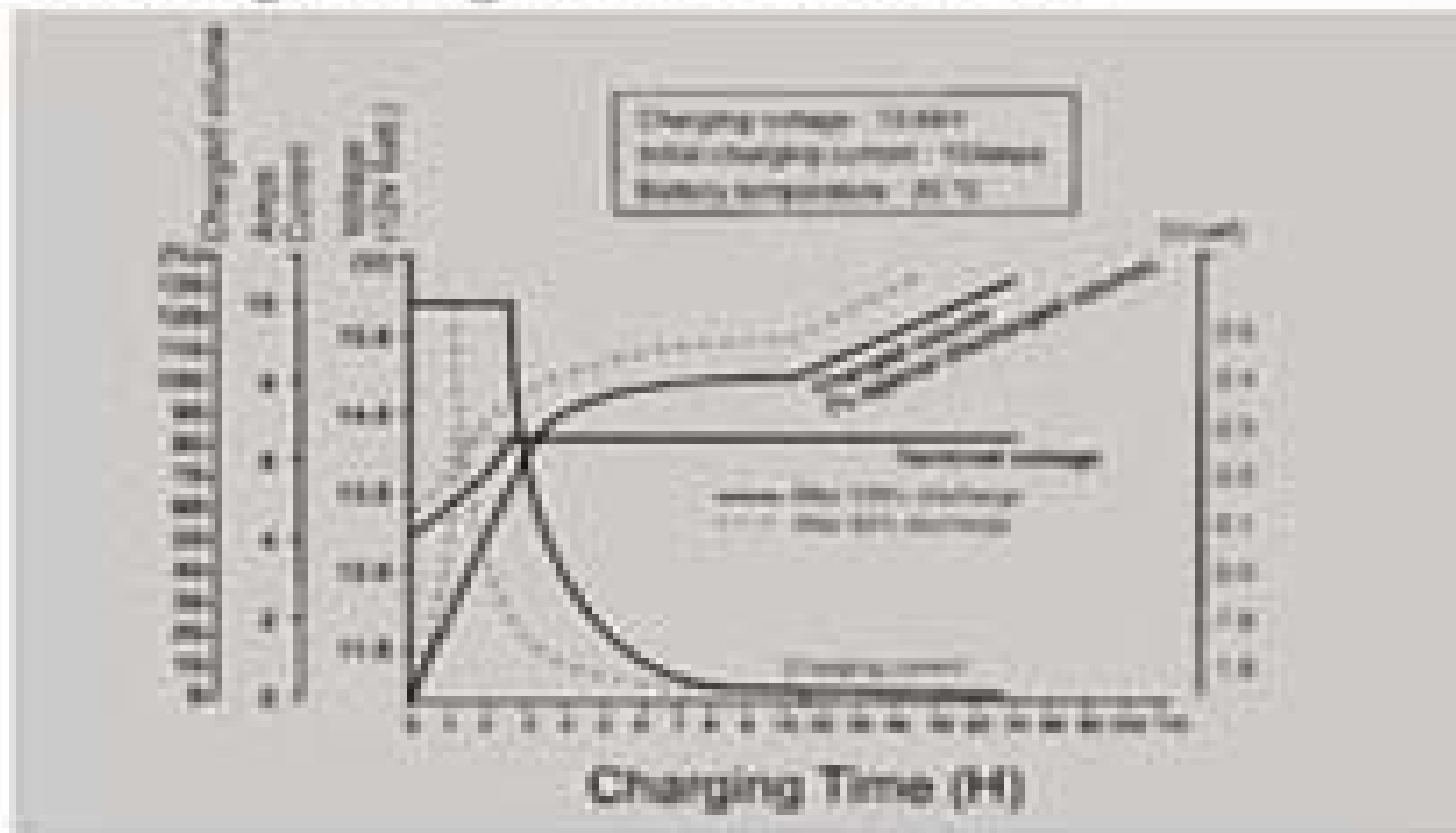
DO'S

- **KEEP THE MAINS SWITCH ALWAYS ON**
- **KEEP THE BATTERY SWITCH ALWAYS ON**
- **KEEP THE BYPASS SWITCH IN UPS POSITION UNDER NORMAL WORKING CONDITION**
- **CONNECT A SAFETY GROUND CONDUCTOR TO THE UPS**
- **SWITCH OFF THE INVERTOR WHEN THE LOADS CONNECTED ARE NOT IN USE.**
- **INCASE OF ANY EMERGENCY PUT OFF ALL THE SWITCHES.**
- **IF THE UPS TRIPS ON ANY FAULT OTHER THAN BATTERY LOW, PUT OFF THE INVERTOR AND RESTART THE UPS FOR NORMAL OUTPUT.**
- **IF THE UPS TRIPS ON BATTERY LOW, PUT OFF THE INVERTOR SWITCH AND PUSH THE RESET BUTTON TO RESET THE SYSTEM. SYSTEM WILL RESET ONLY IF THE BATTERY VOLTAGE IS WITHIN THE LIMIT.**

DON'T'S

- ✘ DO NOT CONNECT THE BATTERY BANK TO THE UPS WITH THE BATTERY SWITCH IN ON POSITION (THIS CAUSES SPARKING)**
- ✘ DO NOT ADJUST THE PRESETS ON THE CONTROL CARDS.**
- ✘ DO NOT RESTART THE SYSTEM BEFORE FINDING OUT THE CAUSE FOR TRIPPING.**
- ✘ DO NOT PRESS THE RESET PUSH BUTTON WHEN THE UPS IS ON NORMAL WORKING CONDITION**
- ✘ DO NOT PRESS THE RESET PUSH BUTTON CONTINUOUSLY TO RESET THE UPS FOR FAULTS OTHER THAN BATTERY LOW.**
- ✘ DO NOT RESTART THE EQUIPMENT WITH ALL LOADS CONNECTED.**

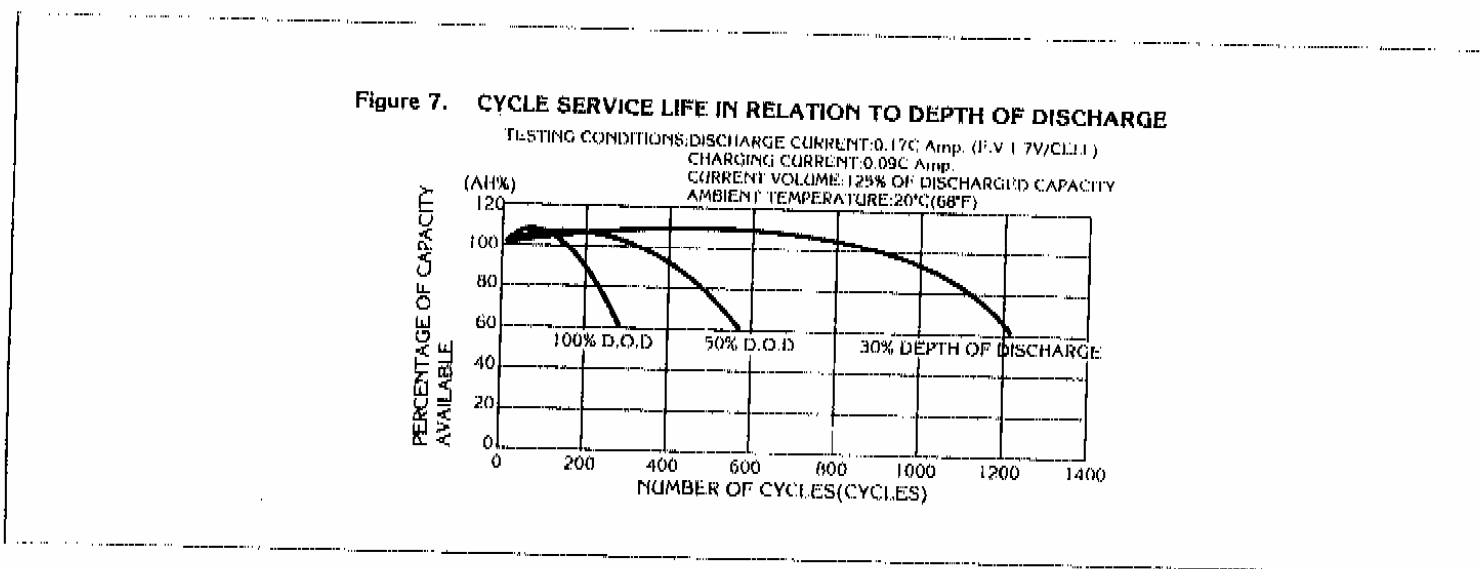
Floating charge Characteristics



SERVICE LIFE

□ Cyclic Life

There are number of factors that affect the length of cycle life of an ES battery. Major factors are the ambient operating temperature, the discharge rate, the depth of discharge, and the manner in which the battery is recharged, of which the most important is the depth of discharge. Figure 7 shows the effects of depth of discharge on cyclic life. The discharge capacity has the trend to increase in the initial stage of the cycle, and reach the maximum capacity at about 50 cycles.



The relation between the expected number of cycles and the depth of discharge is apparent. In case, at a given discharge rate, a longer cyclic life (than that obtained through selection of a capacity following the common practice) is required, it is advisable that you select a battery with larger capacity. At a given discharge rate and time, the shallower the depth of discharge, the longer is the cyclic life.

- As the input being the main power source for all sophisticated computer network equipments of the proposed Billing system, it should have proper earthing arrangements to sink any fault current of the equipments. Make sure earthing arrangements are proper at all locations. In places, where it is not done, shall be arranged as per the earthing arrangement drawing.

UPS system is needs proper ventilation and therefore it is suggested to keep in a location where free air circulation is maintained

While wiring for two or more 2KVA UPS system on the same location, which are supporting different PCs, the o/p neutral wire of one UPS system should not be connected to other UPS o/p neutral.

Do not keep the UPS in a location where its open to sky. Performance of batteries gets affected with high temperature.

BACK-UP DURATION FROM UPS IS GOVERNED BY FOLLOWING FACTORS

BATTERY CAPACITY

LOAD ON UPS

- DEPTH OF DISCHARGE (DOD)

CHARGE QUANTITY AT TIME OF DISCHARGE

- POWER CONDITION
- DISCHARGE EVEN BEFORE FULL RE-CHARGE
- CHARGER TYPE

AGEING & TEMPERATURE

- CAPACITY DETERIOTES BY 15~20% EVERY YEAR
- ALL SMF BATTERY LIFE CYCLE IS RATED AT 25C
- DEPRECIATES TO HALF OF ITS VALUE FOR EVERY 7deg RAISE

WHILE TRANSPORTING

- KEEP BATTERIES IN UPRIGHT POSITION
- PREVENT HEAVY VIBRATION, MECHANICAL SHOCKS

WHILE STORING

- DO NOT KEEP THE BATTERIES UNUSED FOR LONG
- DO NOT LEAVE THE BATTERIES IDLE AFTER DEEP DISCHARGE
IT MAY REACH IRREVERSIBLE CONDITION

Thank you