GALAXY ELECTRONICS (INDIA) INC.

TECHNICAL MANUAL

FOR

TRUE-ON-LINE UPS SYSTUM

Modal -MT - 1 KVA TO 100KVA

BRAND :- (GALAXY)

Website : http://www.galaxyups.com

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I N D E X

SYSTEM DESCRIPTION

This equipment is a 1 / 3 Phase Uninterruptible Power Supply that provides continuous regulated Sine Wave Power, to a Computer System or other critical AC loads.

The System comprises of a Rectifier – Charger and Static- Inverter together with a Battery which is a standby source of energy.

The Rectifier – Charger is a controlled rectifier which provides regulated DC Voltage to the Inverter and simultaneously charges the battery. The charger control circuit senses the battery current and automatically adjusts the Thyristor firingangle so as to control the DC current and keep it equal to the set value. Automatic changeover from CV to CC mode takes place to provide constant voltage, current limited charging which is the best recommended method of battery charging.

The battery charger thus forms an integral part of the rectifier and provides dual voltage with automatic mode switching for optimum battery charging performance.

The function of the inverter is to provide alternating current output from the DC supply. The DC supply is obtained from the rectifier, when the mains supply is present or the battery floating on the DC bus, during mains failure. The inverter design is the most critical part of the UPS System since it is required to have highest reliability as compared to any other part of the system.

Although a number of topologies are applied to produce a reliable design, **GALAXY** uses a Sine – Weighted High Frequency PWM Technique. The inverter design is extremely rugged and provides the ride through for momentary overloads.

The bypass facility enables connecting an alternative souce of power to the load and separation of the UPS circuit from the load. This facility enables easy brakedown-maintenance without having to open any electrical connections for the same (not a standard feature for 1 KVA).

Storage batteries are the energy source for UPS systems during a power outage UPS storage batteries are made up of a string of series connected cells to achieve the operating voltage of the Static Inverter.

TECHNICAL SPECIFICATIONS FOR TRUE-ON-LINE UPS

Model	Single-Phase Output	Three-Phase Output
Rating	6 KVA to 50 KVA	5.0 KVA to 100 KVA
AC INPUT	230 V + 15% - 20% for Single Phase Input 415 v + 15% -20% for Three Phase Input	
Frequency	50 Hz ± 6%	
DC VOLTAGE	180 V DC for Single-Ph.Input 360 V DC for Three-Ph. Input	360V DC
Charging Time	12 Hours for 90% of full Capacity	
Charger Type	Internal Controlled Rectifier Type	
INVERTER		
Technology	IGBT Double Conversion	
Output Voltage	230 V AC Single Phase	230 V AC SINGAL Phase
Voltage Regulation	± 1% for DC I/P variation & O/P load variation	
Frequency	a) 50 Hz ± 0.05 Hz b) 60 Hz ± 0.06 Hz c) Any optional frequency	
Waveform	PWM Sine wave	
Harmonic Distortion	Less than 3%	
Inverter Efficiency	➢ 93% for 360 V DC and above >90% for 180 V DC	
Power Factor	0.8	
Overload	125% for 5 minutes ; 150 % for 60 sec	
Crest Factor	3 : 1	
Transient Recovery	± 4% under full load change and corrected within 60 msec	
Phase Displacement		120º ± 1º
Audible Noise	Less than 45 dB at 1 Meter	
METERING :		
Microprocessor based Digital LCD Meter for	Output Voltage, Output current & Frequency, DC Voltage & current, Battery and Load percentage	R.Y.B. Output Voltage, Output current & Frequency, DC Voltage Battery and Load Percentage
GENERAL :		
Operating temperature	0º C to 50ºC	
Humidity	Max 95% , Non-condensing	
PROTECTIONS :		
Output Overload & Short Circuit, Output Under & Overvoltage, DC Under & overvoltage, Input Under & Overvoltage, Single Phasing & phases Unbalance (for 3-Ph. Input only)		
INDICATIONS & ALARMS		
a) Mains on	Indication	
b) Inverter on	Indication	
c) Mains Fail	Indication & alarm	
d) DC Low	Indication & alarm	
e) DC Over Voltage	Indication & alarm	
f) Output Under Voltage	Indication & alarm	
g) Output Over Voltage	Indication & Alarm	
h) Output Overload	Indication & Alarm	
BY PASS FACILITY		
a) Manual Bypass Switch	Provided as standard feature	
b) Static Bypass Switch (Optional)	Bi-directional	
ISOLATION OF POWER		
Input	MCB Provided	
Output	Switch, MCB (Optional)	
Battery	HRC Fuse, MCB (Optional)	

* Specifications are subject to change without prior notice due to constant improvement in design & technology

CONSTRUCTION

The electronic circuit is housed in a sheet – metal enclosure and is free floor standing type. The status indicators are provided on the front panel together with start, stop & alarm reset switches.

All the connectors fuses input circuit Breaker, Manual Bypass switch are provided at the back of the unit and the same are accessible at the bottom side of the system. The rear end othe cabinet is provided with suitable holes to enable entry of wires / cables in to the system.

The system has been engineered in such a way that the side panels can be removed in minimum amount of time, to ease maintenance, Once the side doors are removed almost all the components are accessible for servicing.

INSTALLATION

To maximize the life of all types of power electronic components a room temperature of 27ºC is recommended. However the equipment is normally designed for temperature ranging from 0 to 50°C.

The equipment is designed for relative humidity from 0 to 95%. Avoid using equipment in locations with high humidity, moisture and corrosive gases / fumes. The surrounding air must be clean and free from electrically conductive dust.

During positioning of the equipment at site, excessive deforming stresses should not be applied to the cabinet. The chosen location must be dry and provide adequare clearance for equipment cooling by allowing free flow of air and proper ventilations in non-air conditioned environment.

The equipment should be installed in locations free from shock and vibrations. Care must be taken in selecting a site for installation to ensure that the activity around the UPS does not affect the functioning of the system. The battery manufacturer's instructions for installation should be followed.

The unit should be checked carefully for damage that may have occurred during shipment. Tigtness of all connections should be checked and it is necessary to ensure that all circuit modules, components, and wiring connectors are in place.

Load Wiring :

1) Keep all the circuit breakers and switches in OFF position before proceeding with wiring.

2) Wires / cables should be routed through the holes provided on rear panel or through cable entry holes at the bottom.

3) The battery fuse should be removed before making the connection. Connection of the battery +ve and Battery –ve terminals should be made Make sure that the battery polarity is not reversed while make connections.

WARNING

Make sure with multi meter that the battery voltage is of Correct Polarity, before connecting the BATTERY

It is important to take into consideration, branch circuit protection during wiring of the loads connected to the UPS. In many applications it is important to isolate a faulted branch circuit as quickly as possible to avoid disturbance to critical loads on other circuits. Branch circuits should be protected with fuses of adequate rating, so as to ensure isolation of a particular branch from the UPS supply, should fault occur on that branch.

It is important to “earth” the cabinet of the UPS preferable using a dedicated “earth” connection. It is also important to ensure correctness and quality of the mains earthing in order to guarantee protective action.

OPERATION

It is recommended that the initial system start up be performed by personnel qualified to make measurements on energized electrical equipment.

Read each step carefully before proceeding with each step

1) Initially, all the switches and circuit breakers should be in the "OFF" position. Now switch "ON" the input circuit breaker. After a delay of 10 sec, several indications on the front plate will turn "ON" , and the buzzer will start sounding.

   Reset the sounding buzzer by pressing the Reset switch.

   The following indications on the front panel will be "ON" after a delay of 10 Sec.

   a) MAINS ON. B) DC LOW

   After resetting, the DC low indication will go. Now press the startswitch to switch on the Inverter. The Output Voltage of the Inverter will build up slowly as will be seen on the output voltmeter/digital display and INVERTER Indication will be on.

2) Check the charging voltage & Current and then connect the battery fuse. After this step, the system is fully energized and ready to be connected to the load. It is recommended that the system runs in this condition for a period of munimum 5 minutes before connecting the load.

3) To connect load on the UPS, put the manual bypass transfer switch in the "LOAD ON INVERTER" position. The inverter output is now available at the output terminal block.

Loads may be switched on in a sequence now. It is important to ensure that the output current as shown on the "OUTPUT AMMETER" / DIGITAL DISPLAY is within the maximum specified rating of the UPS.

Adequate margin is required to be provided when loading the UPS to enable the UPS to supply short duration peak current during start ups of certain loads such as printers.

Note :

The system may be operated without the battery connected. The battery may be disconnected when the system is in operation. It must be understood that the system will no longer be an uninterruptible power supply because a loss of AC input power to the system will result in loss of system output power

4) In this condition if the AC input power fails, the “MAINS ON” indication will turn OFF, MAINS FAIL indication will come ON and give an alsrm for approximately 20 sec. The Inverter is now operating on battery power.

When the battery approaches end of its discharge capacity, at 1.80 V per cell the “DC LOW” indication turns “ON” and battery low Pre-alarm start sounding the audio alarm. The system may shut down in a short while after this indication appears. All critical operations may be shut down in a short while after this indication appears with annunciation of buzzer.

When the battery is totally discharged (Cell voltage is 1.75 V per cell instead of 2 V per cell) the battery Low alarm start sounding and the inverter will turn off instantaneously.

Note :

The approximate duration between battery law pre alarm and battery low alarm shall be 10% of the full back-up.

PROTECTIONS

1. **DC LOW PROTECTION** :

   As soon as the battery is fully discharged, the DC LOW protection circuit automatically stops operation of the Inverter. This prevents further discharge of the battery . This protection is factory set.

2. DC OVER VOLTAGE Protection : DC over voltage condition will only occur if the control action of the rectifier control circuit fails. The DC OVER VOLTAGE detection circuit stops the operation of the rectifier and Inverter as soon as the DC Voltage reaches above the safe value, and the same is indicated on the front panel. This condition will be reset as soon as the reset switch is pressed.

   If the DC OVER VOLTAGE condition persists, the same should be reported to the servicing agency.

3. **OUTPUT UNDER VOLTAGE & OUTPUT OVER VOLTAGE**.

   If the output voltage goes below 200 V or rises beyond 250 V, the detection circuit instantaneously trips the inverter thereby preventing damage to the loads connected. The prevalent condition is indicated on the front panel and the **"INVERTER**" indication will turn **OFF**

   These conditions can be reset as soon as the reset switch & Start switch is pressed.

   If the above condition persist even when the load is disconnected from the system, the same should be reported to the service agency.

4. **OUTPUT OVERLOAD**

   If the inverter is loaded beyond its rated capacity, it will trip and OUTPUT OVERLOAD indication will turn on.

DESCRIPTION OF CARD OPERATION

1. CONVERTER CARD (MPEPL 1057 MPE 018 (SMPS)

The function of this card is to provide regulated DC supply (+ 15 & - 15). Which is used as power supply for the operation of the cards inside the system the converter card accepts input from two souces, Rectified DC Supply from mains and DC supply from the system battery.

Output ON indication is provided on the card, which indicates correct operation of the card and availability of regulated output.

2. RECTIFIER & CHARGER CONTROL CARD (MKPE 008)

Following are the functions of the card.

1. To generate firing pulses for the rectifier – Thyristors.

2. To Adjust the firing angle of the thyristors, so as to keep the rectifier output DC voltage constant. During starting, a soft start is provided, which ensures smooth system start-up.

3. To provide a time delay of approximately 10 sec * After " Mains ON" before producing firing signals for the Thyristors.

4. To sense battery current by measuring voltage drop across shunt and adjust the firing angle to keep battery current constant.

5. To provide protection against in put over-current by sensing Rectifier input current through CT.

6. To inhibit the operation of the rectifier by stopping the firing pulses if "DC OV" condition is signaled by the system monitoring and protection card.

3. PULSE RECTIFIER CARD

The function of the pulse rectifier card is to provide firing pulses of correct polarity to the rectifier thyristors. The signals being obtained from pulse transformer.

This card is normally mounted on top of the pulse transformer.

4. SYSTEM MONITORING AND PROTECTION CARD (MPEPL 103)

The function of this card is to monitor the operation of the complete system continuously and initiate the necessary protective action by disabling operation of the faulted section.

The card is divided in the following five sections :

a. Output under Voltage detection circuit.
b. Output Over voltage detection circuit.
c. DC low detection circuit.
d. DC over voltage detection circuit
e. The DC low and the output UV/OV outputs are connected to the inverter control card to shutdown the Inverter, should these conditions occur.

5. INVERTER CONTROL CARD (MPEPL 101)

The function of this card is to generate PWM pulses, to turn – ON and turn – OFF the Inverter bridge IGBT or MOSFET to produce sinusoidal output

The card is provided regulated supply + 15 V & -15 V from the converter card.

A digitally generated Sine Wave is used as the modulating signal. This signal is compared to a triangular wave form, using a comparator stage. The output of the comparator stage is a Sine weighted PWM signal.

The amplitude of the Sine-wave is varied to control the modulation index and control the output voltage.

Increase in the amplitude of Sine wave causes increase in the output voltage. In closed loop control the output voltage is set to the required value using preset P3. The card receives voltage feed back from feed back transformer. This feed back is rectified and filtered on the card to produce a DC Voltage proportional to the inverter output voltage. This DC voltage is then compared to a fixed reference voltage and the control amplifier output changes continuously to adjust the Sine wave amplitude thereby maintaining tight regulation.

Current feed back is supplied to this card from current transformer. If the output current exceeds the set value the Inverter trips after a certain delay. If a short circuit connection exist at the output, the Inverter trip instantly protecting the power devices (IGBTs & MOSFETs).

The Inverter frequency and output sinusoidal wave form are factory set and hence should not be changed by personel other than the authorized maintenance staff.

6. DISPLAY CARD

The function of the card is to indicate the system status on the front panel of the system.

DRIVER CARD (MPEPL 104 / MPEPL 109)

The function of the driver card is to provide isolated drive to the Inverter IGBTs & MOSFETs and protect them from any damage, should the current through the device exceeds its capacity. The drive card contains two identical driver sections.

Isolated supply for each of this sections is obtained from the isolated outputs of the high frequency converter card. Each of the driver sections receives the PWM signal from Inverter card. This PWM signal is isolated using an opto-feolator. The optically isolated signal is then amplified using a power amplifier stage. The amplified PWM signal is further applied to a Inverter bridge IGBT's MOSFETs

If the current through the Inverter bridge IGBT / MOSFET starts exceeding safe limits, the Inverter is turned OFF by the driver circuit and is turned ON agains only when the start switch is pressed.

INTERPRETATION OF INDICATION AND ALARMS.

1. MAINS ON

This indication will turn on when Mains supply is normal

2. DC LOW

This indication turns ON when the DC Voltage (Input Voltage to the Inverter) is 1.8 V / Cell. When the Inverter is turned off due to DC low, the DC voltage is 1.75 V / Cell.

3. D.C OVERVOLTAGE

This indication turns ON when the DC voltage exceeds the SET limit. Annunciation is provided together with this indication.

4. OUTPUT UNDER VOLTAGE

This indication turns ON if the inverter output voltage drops below the set limit. Annunciation is provided together with this indication.

5. OUTPUT OVERVOLTAGE

This indication will turns ON if the Inverter output voltage exceeds the set limit. Annunciation is provided together with this indication.

6. INVERTER ON

When this indiation turns ON it means that the Inverter is ON

7. MAINS FAIL

This indication, shows failure of Mains supply or abnormal input supply. This indication will remain ON up to 10 seconds even after normal mains supply resumes. Annunciation is provided together with this indication.

8. OUTPUT OVERLOAD

This Indications will come on when the Inverter trips due to extra load or short circuit

9. BATTERY LOW PREALARM

This indication turns or when the Battery Voltage goes to .8 V/Cell. After this indication comes the system will trip by Dc low within a short period at 1.75 V/Cell**.**

Digital Meter : (Optional)

The digital display on the front panel shows the following electrical parameters of the system.

1. Output Voltage
2. Output current
3. Output frequency
4. Dc Voltage
5. DC Current.

The display normally shows the output voltage. The other parameters can be seen sequentially using the arrow key. The display returns to output voltage after 30 seconds.

Load bar graph,

The bar graph display show the approximate percentage of the load connected to the system.

Battery bar graph

The bar graph display shows the approximate percentage of battery level.

Start Switch

The Switch is used to start the system output

Stop Switch

The switch is used to stop the system output

Reset Switch

The reset switch is used to Reset the Indication and Buzzer.

ROUTINE MAINTENANCE

1. CLEANING AND INSPECTION

The system is solid state and contains no moving parts that require periodic maintenance. At least once a year, and more often in dirty environments the system should be inspected for accumulation of dust. Excess dust should be blown out by forced air. At this time a visual inspection for problems such as loose connections and over-heated components should be made.

All the connectors should be checked for tightness. All electrical connections should also be examined for corrosion. DC and AC capacitors should be checked carefully.

Proper maintenance of the battery is very important. Observe the battery manufacturer's instructions for checking electrolyte level and specific gravity, if flooded Lead Acid Batteries are used with the UPS.

2. ADJUSTMENTS

Most of the adjustments should not be changed except by authorized service representative of **MEGATECH POWER EQUIPMENTS PVT.LTD**.Output voltage be checked periodically – at least once every six months is desirable.

3. **TESTING BATTERY OPERATION**.

Battery operation may be checked by disconnecting the normal source of input power to the UPS and observing the transition to battery operation.

(Note : Many batteries are not designed to handle a large number of deep discharge cycles. Repeated testing of capacity of the battery many reduce the ampere –hour capacity and shorten battery life.)

SERVICING PRECAUTIONS

WARNING

The servicing information given in the next few lines is for use by personnel qualified to handle energized electrical equipment & trained on Online uninterruptible power supplied.

Caution :

1) Hazardous voltage will be present during certain measurements.

2) Always be sure that appropriate external power inputs are de-energised before changing connections or disassembling any part of the system.

3) Even with Power off capacitors may store potentially dangerious charges. Care must be taken to avoid contact with capacitors terminals until the charge has been dissipated.

4) Insulated tools having least possible exposed metals should only be used.

TROUBLE SHOOTING GUIDE

A number of likely faults and necessary corrective actions to eliminate the same are listed below :

1. INVERTER TRIPS DUE TO OUTPUT OVER LOAD.

This condition is most likely to occur when the load connected to the UPS exceeds the UPS Capacity, or there is a short circuit in one of the loads connected

All loads shod be disconnected from the UPSand connected one by one. This will help in locating the faulty load, If the load connected exceeds UPS capacity, the same can be checked from the output ammeter/Digital Display provided on the UPS front panel or by an external meter when connecting the loads in a sequence as indicated above.

2. INVERTER TRIPS DUE TO OUTPUT UNDER VOLTAGE.

This condition may occur due to various reasons as indicated below :

I) Failure of driver module DR1 / DR2.
II) Failure of AC capacitor at UPS output
III) Failure of one or more of the IGBT or MOSFET
IV) Failure of Inverter Control Card.
V) Failure of system Monitoring and Protection Card.

3. INVERTER TRIPS DIE TO OUTPUT OVER VOLTAGE.

This condition may occur due to various reasons as indicated below

I) Failure of driver module.
II) Failure of AC capacitor
III) Failure of Inverter control card
IV) Failure of system monitoring and protection care

4. BATTERY DOES NOT CHARGE TO PROVIDE BACKUP DURING MAINS VOLTAGE

   This condition will occur if the fuse connected in serie with the battery is open, or one or more of the cells connected in series to form the battery bank, has gone faulty.

5. SYSTEM DOES NOT START WORKING ON MAINS SUPPLY EVEN AFTER MAINS SUPPLY IS RESTORED. (RECTIFIER DOES NOT START.)

   The above condition can occur due to several reasons as indicated below :

   I) Failure of rectifier card.
   II) Failure of fuse in the incoming supply line to the UPS
   III) Circuit breaker CB1 is OFF

6. THE RECTIFIER STARTS BUT NO INDICATION APPEARS ON THE FRONT PANEL. THE INVERTER ALSO DOES NOT START.

   This condition will appear only when the SMPS stops working. This could also be because of failure of fuse on SMPS card.

COMPUTER INTERFACE (OPTIONAL)

Located on the back panel of the UPS is a communication connector optional for the UPS & the computer system to communicate with each other.

This facility may be used by various operating systems/environments to provide UPS information (status information) to the users and also trigger a graceful shutdown, just before the battery stored charge is completely exhausted.

The connector provided on the back panel of the UPS is a 9 pin Female Connector (DB9-female)

This interface is a completely isolated (electrically isolated) one. The singals given by the UPS are obtained from potential free contacts, and the “UPS Shutdown “ signal is isolated inside the UPS using an optocoupler.

The Pin connections on this connector are as follows :

Pin No.	Function	Description
2	Power Fail	A low level on this pin indicates input AC failure
4.	PC Ground	Ground for all the signals on the connector
5	Battery low	A low level on this pin indicates UPS battery low
6	Shut-down UPS	Active high signals from the Computer to shut down UPS

OPERATION STATIC SWITCH (OPTIONAL)

This static switch is a solid state switch. One static switch is present in the inverter output and the other is connected in series with the bypass supply. The output of both the static switches is made common and the load is connected to this point. For an Online System which is also called the Inverter preferred system, the Inverter Static Switch is normally bypass static switch turn “ON” & Vice versa. This operation is fully automatic and does not need any manual operation.

The Static Switch consists of back-to-back connected thyristor pair where each thyristor is fired for one half of the AC supply cycle. Static switch control card does the job of generating the firing pulses, and supplying them to the respective pulse transformer of the respective thyristor depending on the positive or negative cycle of AC supply. PB7 generates firing signals for all the four thyristors (i.e. both the static switches) depending on the status of relay RL1. if RL1. is “ON” Inverter static switch is turned “ON” and bypass static switch is turned. “OFF” if the relay drops out, the inverter static switch is turned “OFF” and the bypass static switch is turned “ON”

TROUBLE SHOOTINGS GUIDE (STATIC BYPASS)

A number of likely faults, and necessary corrective action to eliminate the same , are listed below.

1. The Inverter has failed but bypass supply is not available at the output. (Bypass static switch remains OFF)

a) This condition is likely to occur if fuse is blown.

b) This condition is likely to occur if fuse F8 is open or the transformer XII does not produce the required output voltages which are necessary for the correct operation of the card.

c) This condition is likely to occur if thyristors TH1 & TH2 are damaged.

2.The Inverter is “ON” but Inverter static switch is not “ON”

a) This condition is likely to occur if fuse F9 is open or the tranformer X12 does not produce the required output voltages which are necessary for the correct operation of the card.

b) This condition is likely to occur if Thyristors TH3 and TH4 are damaged.

c) An active LOW signal on wire number 106 is required to be present to turn on Inverter static switch.

USERS GUIDE PROBLEMS IN UPS OPERATION (CHECKS TO BE PERFORMED)

1. UPS does not start operating on Mains although mains supply is restored.

a) Check the position of input circuit breaker. If this breaker is OFF, theUPS will not start operating on Mains although the Mains supply is restored.

b) Measure with a multi meter, voltage at input terminal block of the UPS. If the supply is not available, UPS will not work despite restoration of mains supply. This condition is likely to occur if the cable connecting the UPS input to the main distribution box is open at one or more points or if the fuse in the main distribution board is open.

c) If the commercial / Mains supploy is less than 185 V AC, the UPS rectifier may not turn ON. The input supply range to the UPS is specified in the manufacturers catalogue.

2.No output is available from the UPS although the front panel indicates that the UPS Inverter is ON.

a) Check the position of UPS output circuit breaker. If this circuit breaker has been put OFF Inverter output AC supply will not be available at the output terminal block of the UPS.

b) If the cable /wiring connected to the UPS output terminal block is open at one or more points, AC supply may not be available at the distribution board sockets.

3. Voltage measured between Earth, Phase & Neutral at the distribution board sockets connected to the UPS output are incorrect.

a) Check the connections of the interconnecting wires and the labeling at the UPS output terminal block. If the connections have got interchanged while connecting the load side wiring to the UPS output, the same should be corrected.

b) Of the earthing provided is not proper erroneous voltages will be recorded. It is normally recommended, to provide a dedicated earth connection for the UPS and the Computer System.

4. **Incorrect output available when the bypass transfer switch is put in "BYPASS" position**.

   a) When the bypass transfer switch is in "BYPASS" position, supply available at bypass terminal block is made available at the inverter output terminal block. If no AC suppky is connected or fuse/cable connecting this supply to the UPS is open, the above condition is likely to result.

   b) The bypass source should be well regulated AC source such as a SCVS (Servo Controlled / Solid state Voltage Stabiliser) or a CVT (Constant Voltage Transformer). If this source is not a well regulated source, the above condition may result.

5. The UPS fails immediately after the mains supply fails and no battery backup is available.

   a) If one of the interconnecting links in the battery bank is open, the above condition is likely to result. This condition can be checked by disconnecting the battery from the UPS and measuring the voltage of the complete bank.

   b) If one of the cells in the battery is damaged, the above condition is likely to occur. This may be checked by measuring voltage of each cell individually.

   c) This condition may occur if the battery fuse inside the UPS is open. The fuse can be checked by opening the back panel of the UPS.

6. Inverter has tripped and the status display shows output OVERLOAD.

   a) Disconnect the load connected to the UPS .

   b) Press the fault reset switch. If the Inverter starts smoothly it is likely that the above fault was due to a short circuit/overload condition. Reconnect the loads one by one, i.e. one load at a time, or by energizing one branch at a time. In case the fault condition is present (i.e. overload or short circuit) the UPS inverter would trip again.

      The above exercise would enable isolation of a faulty branch circuit / load. If the UPS does not start even on clear loads, smoothly the same should be reported to the service agency.

   c) The equipment is likely to malfunction if the ambient temperature surrounding the UPS is beyond the specified likely. A minimum of `1' feet clearnce is necessary on all sides of the UPS and also on the top to allow hot air inside the UPS to be ventilated.

7. Although commercial AC supply is available the battery does not get charged. The UPS inverter continues to work satisfactorily .

   a) The battery may not get charged If one of the cells is open on the cells need servicing. Battery state can be easily verified by measuring individual battery voltage, individual cell voltage, by measuring total battery bank voltage and by measuring specific gravity of the acid inside the battery.

   b) This condition may occur if the battery fuse inside the UPS is open. The fuse can be checked by opening the back panel of the UPS

8. Alarm starts sounding although the cause if not immediately apparent.

   a) The alarm annunciation circuit inside the UPS is very sensitive and gets activated even due to momentary failure of mains supply / abnormal line conditions which may not be visible to the naked eye.

Since some of the indications such as “Mains Fail” , Lbattery Low” etc., are not latched and they only show the instantaneous status of the system, it is likely that the alarm keeps sounding although the fault indication is no longer exist. Therefore the same will get automatically updated after the fault gets corrected.

WARRANTY

Galaxy Electronics (I) Inc. , (herein after referred to as the Company: warrantys the purchaser of **Galaxy Electronics (I) Inc**. that is free to defects in material and components which if proven to suffer from manufacturing defects within a period of 12 months from the date of supply, will be provided free services, repairs.

This warranty does not extend to any part of **Galaxy Electronics (I) Inc.** which has been subjected to misuse, neglect, accident or improper installation. Further, this warranty does not extend to **Galaxy Electronics (I) Inc.** Which may have been tampered with, altered with or serviced by any agency not authorized by the Company and which in our opinion affect its reliability and performance. The Company's sole liability shall be to repair or replace defective parts or components as specified above.

The warranty confines to the first purchaser of the system. The Company or its authorized Service Centre shall render the services within the stipulated warranty period. The company will not be held responsible for delay in servicing due to reasons beyond the control of the company.

SCHEDULE OF EQUIPMENT

1.	**MODEL**	
2.	**RATING**	
3.	**DATE OF SUPPLY**	
4.	**TYPE OF BATTERY**	
5.	**LOAD CONNECTED**	
6.	**SITE**	
7.	**SL.NO. OF THE SYSTEM**	

GALAXY ELECTRONICS (I) INC.

Authorized Signatory

APPENDIX A

APPENDIX A – 1

TEST CERTIFICATE

System Description : TRUE-ON-LINE UPS

Serial Number :

Rating :

Buyer :

(Quality Control Department) ***(Production Department)***

Date:

(Company Seal)

APPENDIX A – 2

WARRANTY CERTIFICATE

System Description : *True – On – Line UPS*

Serial Number :

Rating :

Buyer :

This unit is warranty against all manufacturing and workmanship defects upto a period of 12 months from the date commissioning or 13 months from the date of supply, whichever is earlier.

This warranty is valid only if the unit is used to its electrical, mechanical and environmental specifications and no consequential damage are accepted under this warranty.

(Quality Control Department) **(Production Department)**

Date : **(Company Seal)**

APPENDIX A – 3

REPLY CARD

System Description :

Serial Number :

Rating :

Date of Dispatch :

Client Information

Name :
Address :
Contact Person :
Department :
Phone (with STD Code) : **Fax :**

Dealer's Information

Name :
Address :
Contact Persons :
Department :
Phone(with STD Code) : **Fax :**

(Dealer's Seal)

GALAXY ELECTRONICS (INDIA) INC.

10.0 LIST OF REGIONAL OFFICES / SERVICE CENTERS

SR.	LOCATION	PHONE (S)	FAX (STD
1.	**PUNE** (Sales& HO)	40084939	020-40084939
2.	**MUMBAI**	25791800 25790461	022-25774087
3.	**DELHI**	55705321 39548589	011-22022087
4.	**HYDERABAD**	27051318	040-27069029
5.	**AHAMDABAD**	**079-25451577**	

HELP LINE EMAIL: manager@galaxyups.com