

# Regulated DC Power Supplies

PRODUCT CODE (ASICC)	: 77207
QUALITY AND STANDARDS	: IS 7204 :1981 IS 7204:1980 Stabilised power supplies (Part 1) Terms and definition (Part 2) Rating and performance (Part 3) Radio Interference tests (Part 4) Tests other than radio frequency interference
PRODUCTION CAPACITY	: 1. Qty. :1200 Nos. (per annum) of PSUs 5 V, 5A. Value : Rs. 18,00,000  2. Qty. :1200 Nos. (per annum) PSUs 30V,2A Value : Rs. 24,00,000
YEAR OF PREPARATION	: 2002–2003
PREPARED AND UPDATED BY	: Small Industries Service Institute 65/1 GST Road, Guindy, Chennai-600032 And Office of the Development Commissioner (Small Scale Industries), Electronics and Electrical Division, 7th Floor, Nirman Bhavan, New Delhi-110011.

## INTRODUCTION

Regulated DC power supplies provide accurate DC voltage, which are derived from AC mains. These DC supplies are cheaper in nature than the DC sources from battery. Such supplies provide constant voltage irrespective of load variations for which they are designed. DC power supplies are used extensively in various electronics laboratories, industries and communication departments to feed DC voltage to the electronic modules, R and D sections, institutions and colleges to impart practical training etc. Present range of electronic equipment produced in the

country makes use of transistors and integrated circuits. These IC's are designed to work on fixed regulated DC voltages. Therefore, such supplies have become the part and parcel of such equipment and are:

1. Preset Power supplies (single or dual supply type)
2. Variable power supplies

*Preset Power Supplies (Single or Dual supply type)*

These power supplies are generally custom made and preset for fixed voltages like 5V/10V/15 Volts etc. These supply units are normally mounted on/integrated into the electronic equipment.

As such these power supplies are not fitted with any cabinets. These power supplies are used in computers.

### *Variable Power Supplies*

Variable power supplies are supplies in which the voltage can be varied continuously with the knob as per requirement. They are generally available in the range of 5 to 30 volts in 0.5 to 10 amps capacities. These supplies are generally used in research institutions, colleges, practical training centers and electronic industries, etc.

## MARKET POTENTIAL

There are hundreds of small-scale units engaged in the manufacture of regulated DC power supplies in the country. The production of computers, control and instruments sector, aerospace, defence and telecommunication equipment is steadily increasing and the demand for such supplies is also proportionately increasing. Some of the units have been exporting these power supplies to the Middle East countries.

## BASIS AND PRESUMPTIONS

- i) The basis for calculation of production capacity has been taken on single shift basis on 75% efficiency.
- ii) The maximum capacity utilization on single shift basis for 300 days a year. During first year and second year of operations the capacity utilization is 60% and 80% respectively. The unit is expected to achieve full capacity

utilization from the third year onwards.

- iii) The salaries and wages, cost of raw materials, utilities, rents, etc. are based on the prevailing rates in and around Chennai. These cost factors are likely to vary with time and location.
- iv) Interest on term loan and working capital loan has been taken at the rate of 16% on an average. This rate may vary depending upon the policy of the financial institutions/agencies from time to time.
- v) The cost of machinery and equipments refer to a particular make/model and prices are approximate.
- vi) The break-even point percentage indicated is of full capacity utilization.
- vii) The project preparation cost etc. whenever required could be considered under pre-operative expenses.
- viii) The essential production machinery and test equipment required for the project have been indicated. The unit may also utilize common test facilities available at Electronics Test and Development Centres (ETDCs) and Electronic Regional Test Laboratories (ERTLs) set up by the State Governments and STQC, Directorate of the Department of Information Technology, Ministry of Communication and Information Technology, to manufacture products conforming to Bureau of Indian Standards.

## IMPLEMENTATION SCHEDULE

The major activities in the implementation of the project has been listed and the average time for implementation of the project is estimated at 12 months:

Sl. No.	Name of Activity	Period in Months (Estimated)
1.	Preparation of project report	1
2.	Registration and other formalities	1
3.	Sanction of loan by financial institutions	3
4.	Plant and Machinery:	
	(a) Placement of orders	1
	(b) Procurement	2
	(c) Power connection/ Electrification	2
	(d) Installation/Erection of machinery/Test Equipment	2
5.	Procurement of raw materials	2
6.	Recruitment of Technical Personnel etc.	2
7.	Trial production	11
8.	Commercial production	12

### Notes

- Many of the above activities shall be initiated concurrently
- Procurement of raw materials commences from the 8th month onwards.
- When imported plant and machinery are required, the implementation period of project may vary from 12 months to 15 months.

## TECHNICAL ASPECTS

### Process of Manufacture

The manufacture of DC power supplies involves design assembly and

testing. The printed circuit boards (PCBs) are to be procured as per design and drawings prepared. The chassis and front panel are obtained as per order placed on supplier. The components are soldered on to the PCBs as per circuit diagram. Such PCBs and other large/heavy components like power transformers are wired on to the main chasis. The necessary switches and sockets are fitted and wired. The assembled power supply is checked for performance and necessary adjustments are made, so as to conform to specifications already laid down. Latest technique of on card regulators is being utilized extensively for easy maintenance and quick fault findings.

### Quality Control and Standards

IS 7204: 1980	Stabilised power supplies DC output
(Part 1)	Terms and definition
(Part 2)	Rating and performance
(Part 3)	Radio Interference tests
(Part 4)	Tests other than radio frequency interference

### Production Capacity (per annum)

1200 Nos. of PSUs 5V, 5A at Rs. 1500 each =	
Rs.1200 × 1500 = 18,00,000 and 1200 Nos. of	
variable power supplies 30 V 2A @ Rs. 2000 = 1200	
× 2000 = Rs. 24,00,000	
Total	Rs. 2,00,000

Motive Power 5 KVA.

### Pollution Control

The Govt. accords utmost importance to control environmental pollution. The small-scale entrepreneurs should have an environmental friendly attitude and adopt pollution control measures by process modification and technology substitution.

India having acceded to the Montreal Protocol in Sept. 1992, the production and use of Ozone Depleting Substances (ODS) like Chlorofluoro Carbon (CFC), Carbon Tetrachloride, Halons and Methyl Chloroform etc. need to be phased out immediately with alternative chemicals/solvents. A notification for detailed Rules to regulate ODS phase out under the Environment Protection Act, 1986 have been put in place with effect from 19th July 2000.

The following steps are suggested which may help to control pollution in electronics industry wherever applicable:

- i) In electronic industry fumes and gases are released during hand soldering/wave soldering/Dip soldering, which are harmful to people as well as environment and the end products. Alternate technologies may be used to phase out the existing polluting technologies. Numerous new fluxes have been developed containing 2-10% solids as opposed to the traditional 15-35% solids.
- ii) Electronic industry uses CFC, Carbon Tetrachloride and Methyl Chloroform for cleaning of printed circuit boards after assembly to remove flux residues left after soldering, and various kinds of foams for packaging.

Many alternative solvents could replace CFC-113 and Methyl Chloroform in electronics cleaning. Other Chlorinated solvents such as Trichloroethylene, Perchloroethylene and Methylene Chloride have been used as effective cleaners in electronics

industry for many years. Other organic solvents such as Ketones and Alcohols are effective in removing both solder fluxes and many polar contaminants.

### Energy Conservation

With the growing energy needs and shortage coupled with rising energy cost, a greater thrust in energy efficiency in industrial sector has been given by the Govt. of India since 1980s. The Energy Conservation Act, 2001 has been enacted on 18th August 2001, which provides for efficient use of energy, its conservation and capacity building of Bureau of Energy Efficiency created under the Act.

The following steps may help for conservation of electrical energy:

- i) Adoption of energy conserving technologies, production aids and testing facilities.
- ii) Efficient management of process/manufacturing machineries and systems, QC and testing equipments for yielding maximum Energy Conservation.
- iii) Optimum use of electrical energy for heating during soldering process can be obtained by using efficient temperature controlled soldering and desoldering stations.
- iv) Periodical maintenance of motors, compressors etc.
- v) Use of power factor correction capacitors. Proper selection and layout of lighting system; timely switching on-off of the lights; use of compact fluorescent lamps wherever possible etc.

## FINANCIAL ASPECTS

### A. Fixed Capital

#### (i) Land and Building

Built up area	200 sq. meters
Office/stores	50 sq. meters
Factory	150 sq. meters

#### (ii) Machinery and Equipments

Sl. No.	Description	Qty.	Rate (Rs.)	Amount (Rs.)
1.	Bench Grinder	1	5,000	5,000
2.	Digital multimeter (4½ digit)	1	8,500	8,500
3.	Dimmerstats (4 and 8 amps)	4	2,000	8,000
4.	Drilling machine (1/2')	1	5,000	5,000
5.	H V tester	1	6,000	6,000
6.	Megger.	1	4500	4500
7.	Multimeter Analog	3	1,000	3,000
8.	Oscilloscope dual trace (20 MHz)	2	20,000	40,000
9.	Panel meters	4	250	1,000
10.	True RMS meter (4 digit)	1	8,000	8,000
11.	Installation and electrification @ 10% of machinery and equipments			8,900
12.	Office furniture and equipments			30,000
13.	Tools Dies and equipments			20,000
	(iii) Pre-operative Expenses			10,000
	Total			1,57,900
	or Say			1,58,000

### B. Working Capital (per month)

#### (i) Salaries and Wages (per month)

Sl. No.	Description	Qty.	Rate (Rs.)	Amount (Rs.)
1.	Accountant	1	3,000	3,000
2.	Design Engineer-cum Production in charge	1	5,000	5,000
3.	R and D Design Engineer	1	4,500	4,500
4.	Sales manager	1	3,500	3,500

5.	Un-skilled workers	2	2,000	4,000
6.	Skilled workers	2	4,000	8,000
7.	Typist / clerk	2	2,500	5,000
	Total			33,000
	Perquisites @ 15%			5,000
	Total			38,000

#### (ii) Raw Material (per month)

Sl. No.	Description	Qty. (sets)	Rate (Rs.)	Total (Rs.)
<i>(a) For PSUs (5V,5A) (100 sets)</i>				
1.	Transformer	100	270	27000
2.	Semiconductor devices (ICs, SCR, rectifier, diodes, transistors, LEDs etc.)	100	285	28500
3.	Chasis/cabinet with heat sink	100	115	11500
4.	Printed circuit boards	100	20	2000
5.	Resistors and capacitors including filter capacitors and trim pot	100	200	20000
6.	Termination, switches fuse assembly potentiometer, hook up wire, mains, cards and misc. hardware etc.	100	150	15,000
	Total			1,04,000
<i>(b) For Variable Power Supply (30V, 2A) (100 sets)</i>				
1.	Transformer	100	310	31000
2.	Semiconductor devices (ICs, SCR, rectifier, diodes, transistors, LEDs etc.)	100	125	12500
3.	Chasis/cabinet with heat sink	100	115	11500
4.	Printed circuit boards	100	15	1500
5.	Resistors and capacitors including filter capacitors and trim pot	100	175	17500
6.	Termination, switches fuse assembly potentiometer, hook up wire, mains, cards and misc. hardware etc.	100	150	15,000
7.	Current/Volts meters	100	430	43,000
	Total			1,32,000
	Total Cost of Raw Materials/ Components (per month) (a+ b)			2,36,000

## (iii) Utilities (per month)

Sl. Description No.	Amount (Rs.)
1. Power	2000
2. Water	500
Total	2,500

## (iv) Other Contingent Expenses (per month)

Sl. Description No.	Amount (Rs.)
1. Advertisement and Publicity	3,000
2. Consumable stores	4,000
3. Insurance	500
4. Misc. Expenditure	1,000
5. Postage and stationery	2,000
6. Rent	5,000
7. Repairs and maintenance	1,500
8. Telephone/fax	4,000
9. Transport charges	5,000
Total	26,000

(v) Working Capital (i+ii+iii+iv) Rs. 3,02,500

(vi) Working Capital for 3 Months Rs. 9, 07,500

## C. Total Capital Investment

Fixed capital	Rs. 1,58,000
Working capital for 3 months	Rs. 9,07,500
Total	Rs. 10,65,500

## FINANCIAL ANALYSIS

## (1) Cost of Production (per annum)

Sl. Description No.	Amount (Rs.)
1. Depreciation on machinery and equipment @ 10%	8,900
2. Depreciation on office furniture @20%	6,000
3. Depreciation on tools @ 25%	5,000
4. Recurring expenditure	36,30,000
5. Interest on capital investment @16%	1,70,480
Total	38,20,380
or Say	38,20,000

## (2) Sales (per annum)

1200 Nos. of PSUs 5V, 5A at Rs. 1500 each = Rs. 1200 × 1500 = 18,00,000 and 1200 Nos. of variable power supply 30V 2A @ Rs. 2000 = 1200 × 2000 = Rs. 24,00,000	
Total	Rs. 42,00,000

## (3) Profit (per annum)

	(Rs.)
Sales	42,00,000
Cost of production	38,20,000
Total	3,80,000

(4) Profit (per annum) (Before Taxes) Rs. 3,80,000

$$\begin{aligned} \text{(5) Net Profit Ratio} &= \frac{\text{Profit (per annum)} \times 100}{\text{Sales (per annum)}} \\ &= \frac{380000 \times 100}{4200000} \\ &= 9.05\% \end{aligned}$$

$$\begin{aligned} \text{(6) Rate of Return} &= \frac{\text{Profit (per annum)} \times 100}{\text{Total capital investment}} \\ &= \frac{380000 \times 100}{1065500} \\ &= 35.66\% \end{aligned}$$

## (7) Break-even Point

Fixed Cost (per annum)	(Rs.)
Rent	60000
Depreciation on machinery and equipment @ 10 %	8900
Depreciation on tools, jigs and fixtures @ 25%	5000
Depreciation on office furniture @ 20%	6000
Interest on total capital investment @ 16%	170480
Insurance and Taxes	6000
40% Salaries and wages	182400
40% other contingent expenses and utilities (excluding rent and insurance)	110400
Total	549180
or Say	549000

$$\begin{aligned} \text{B.E.P.} &= \frac{\text{Fixed cost} \times 100}{\text{Fixed cost} + \text{Profit}} \\ &= \frac{549000 \times 100}{549000 + 380000} \\ &= 59.09\% \end{aligned}$$

### Additional Information

- (a) The Project Profile may be modified/tailored to suit the individual entrepreneurship qualities/capacity, production programme and also to suit the locational characteristics, wherever applicable.
- (b) The Electronics Technology is undergoing rapid strides of change and there is need for regular monitoring of the national and international technology scenario. The unit may, therefore, keep abreast with the new technologies in order to keep them in pace with the developments for global competition.
- (c) Quality today is not only confined to the product or service alone. It also extends to the process and environment in which they are generated. The ISO 9000 defines standards for Quality Management Systems and ISO 14001 defines standards for Environmental Management System for acceptability at international level. The unit may therefore adopt these standards for global competition.
- (d) The margin money recommended is 25% of the working capital requirement at an average. However, the percentage of margin money may vary as per bank's discretion.

### Addresses of Machinery and Equipment Suppliers

1. M/s. Bharat Electronic Ltd.  
Jallahalli,  
Bangalore.

2. M/s. British Physical Laboratories  
93, Nehru Place,  
New Delhi - 110019
3. M/s. Chaudhary Trading Co.  
1681/11, Bhagirat Place,  
Chandni Chowk,  
New Delhi - 110006
4. M/s. E C I L  
Cherapalli,  
Hyderabad.
5. M/s. Integral Systems and  
Components (P) Ltd.  
45/7-A, Gubbana Industrial  
Estate,  
VI-Block, Rajaji Nagar,  
Bangalore
6. M/s. Kiber India  
Mahal Industrial Area,  
Andheri East,  
Mumbai - 93
7. M/s. M R Electronics Components  
Limited  
Mount Road,  
Chennai - 2
8. M/s. Noble Electronics  
354, Lajpat Raj Market,  
Delhi - 110006
9. M/s. Nippen Electrical Instruments  
12A, Marol Maroshi Road,  
Andheri East,  
Mumbai -400 059.

### Raw Material Suppliers

1. M/s. Leader Electronics Corpn.  
2-6-33, Tsunashima Hijiashi  
Kahoku Ku, Yokohoma,  
Japan
2. M/s. Pieco Electronics and  
Electricals Limited  
Ramon House,  
169, Bakbay Reclamation,  
Mumbai - 400020.

3. M/s. Transtronix India Pvt. Ltd.  
80A, DDA Sheds,  
Okhla, Phase-II,  
New Delhi -110020.
4. M/s. Uptron India Ltd.  
10 Adhok Marg,  
Lucknow-226001.
5. M/s. Applied Electronics Ltd.  
A-5, Wagle Industrial Estate,  
Thane, Mumbai-400004
6. M/s. Golden Industries  
2, Bhadurgarh Road,  
Sadar Bazar,  
Delhi -110006.