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16004

PUBLIC ADDRESS SYSTEMS PRODUCTION PLANT PROFILE

INTRODUCTION

As the name implies, a Public Address (PA) system facilitates transmission of verbal communication from the speaker to a target group of audiance. Since there are physical limitations to the loudness of human voice as well as hearing capacity, PA system becomes very handy, for addressing gathering of people spread over a large area, indoors or outdoors.

A PA system consists of an audio amplifier, microphone and horn speakers. The underlying principle of its operation is the conversion of sound into electrical energy using an electro-mechanical device called microphone. Electrical energy is amplified using an amplifier. The output of the amplifier becomes the input to an electromechanical transducer, called Loudspeaker, which converts it into sound energy. The amplifier can raise sound energy to any desired level depending upon its power output. A photograph and circuit diagram of a typical amplifier are shown in Fig 1 and 2 respectively.

SPECIFICATIONS (typical)

(A) Amplifier

Output power	: 100W
No. of input channels	: 4
Frequency Range	: 60-15000 Hz
Supply Voltage	: 220 V AC, 50 Hz
Output	: 4 ohms, 8 ohms 100 V, 70 V

(B) Microphone

Frequency Range	: 125-14000 Hz
Impedance	: 200 ohms

..../2.

(C) Speaker

Power Rating	: 40W
Frequency Range	: 120-14000 Hz
Input Voltage	: 100V, 70V

MARKET

PA systems find usage in all walks of life. These systems are used for political, religious/cultural functions, airports, railways, police etc. It may also take the form of mobile announcement systems for mob guidance and control. If we consider population as a criteria, on an average, there is a requirement of one PA system for every 2500 persons in urban areas in India.

ASSEMBLY OPERATIONS

In a typical plant for the manufacture of PA system, microphone and loudspeaker are bought out items and amplifier is assembled inhouse. The assembly of amplifier involves mounting and soldering of electronic components on a printed circuit board, final assembly in a metal housing, testing and packing. The process remains the same irrespective of the quality, specifications and performance of the amplifier. This is so because the performance depends upon the circuit design, type of components and testing procedures. The process flow chart is shown in Fig.3. It is possible to manufacture inhouse, sub-assemblies/parts like housing/chasis, PCBs, transformers etc. in the second phase by acquiring additional machinery, should the demand and cost economies justify the same.

Assembly of the amplifier requires a few precautions. Due to high gain of amplifier stages, a proper care must be taken in respect of component layout. All input and output leads must be routed away from each other. Due to heavy currents involved at the output stage, thick wires must be used to minimise circuit losses. All ground connections must be taken only at one point. Since a power transistor is utilised in the circuit, care has to be taken to use oversize heat sink. It should also be electrically insulated from the heat sink as its collector lead is not insulated from its case.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity is proposed to be 2000 Nos. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/ equipment, space etc.

..../3.

REQUIRED MACHINERY AND EQUIPMENT

1. Signal Generator (50 Hz - 10 MHz)
2. Oscilloscope (10 MHz)
3. Transistor Tester
4. Power Supplies (0-30 V, 2A)
5. Audio wattmeter (100W)
6. Multimeters
7. Soldering irons
8. Drilling machine
9. Bench grinder
10. Tools, dies, jigs and fixtures for mechanical components
11. Work benches

FOB(INDIA) price of machinery and equipment: US$ 20,000 (approx)

REQUIRED RAW MATERIALS AND COMPONENTS

1. Transistors
2. Resistors
3. Diodes
4. Electrolytic, Ceramic and polyster capacitors
5. Stepdown transformer (230V -10V, 1 AMP)
6. Fuses (2 AMP)
7. Potentiometers
8. Printed Circuit Board
9. DPDT Switch
10. Wires and Cables
11. Chasis/Housing, knobs, dials, and hardware
12. Microphones
13. Loudspeakers

SOURCES OF SUPPLY

All equipment , raw materials and components are availabl in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Some of the equipment suppliers are given in the Annexure.

..../4.

REQUIRED UTILITIES

Electric Power	: 25 KVA
Power consumption/month	: 2800 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing & Purchase Manager	: 1
Marketing/Purchase Assistant	: 2
Testing and Inspection	: 2
Skilled Workers	: 8
Semi-skilled Workers	: 6
Un-skilled Workers	: 2
Administration/Accounts	: 6

Skills required for assembly of PA system are simple and can be acquired by about 4 weeks on the job training in assembly, test/inspection and servicing. For skilled technicians, a vocational school background is necessary while the Production Manager should preferably be a Graduate in Electronics/Electrical Engineering.

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/ assembly of PA systems. They can be assembled in any moderately clean surroundings. Building should preferably be of RCC structure to minimise dust.

DIVERSIFICATION PROGRAMME

Once the unit is fully established, other consumer electronic items like Hi-Fi amplifiers, tape recorders etc. can be added in the product mix utilising almost the same production facilities and marketing network.

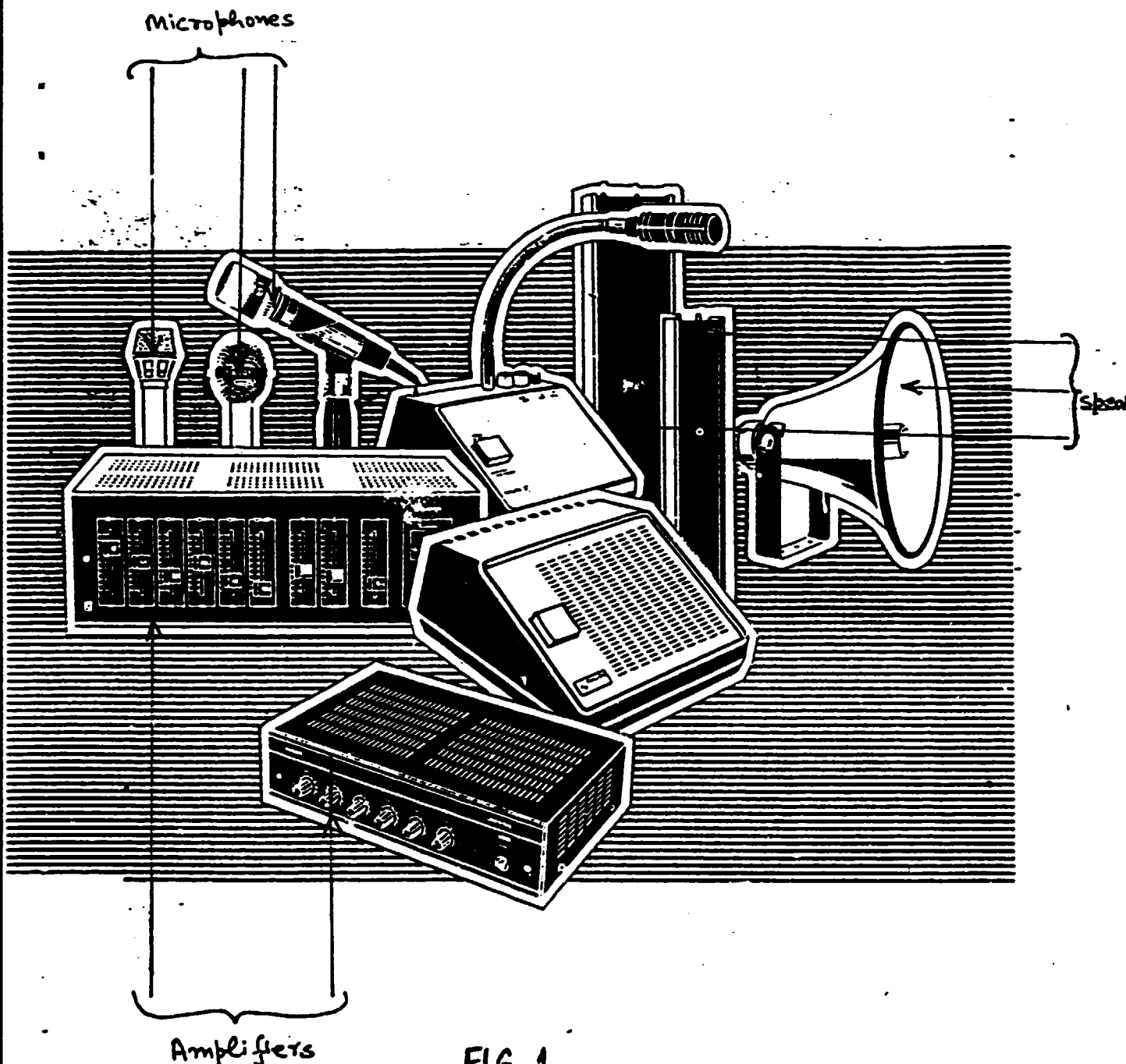
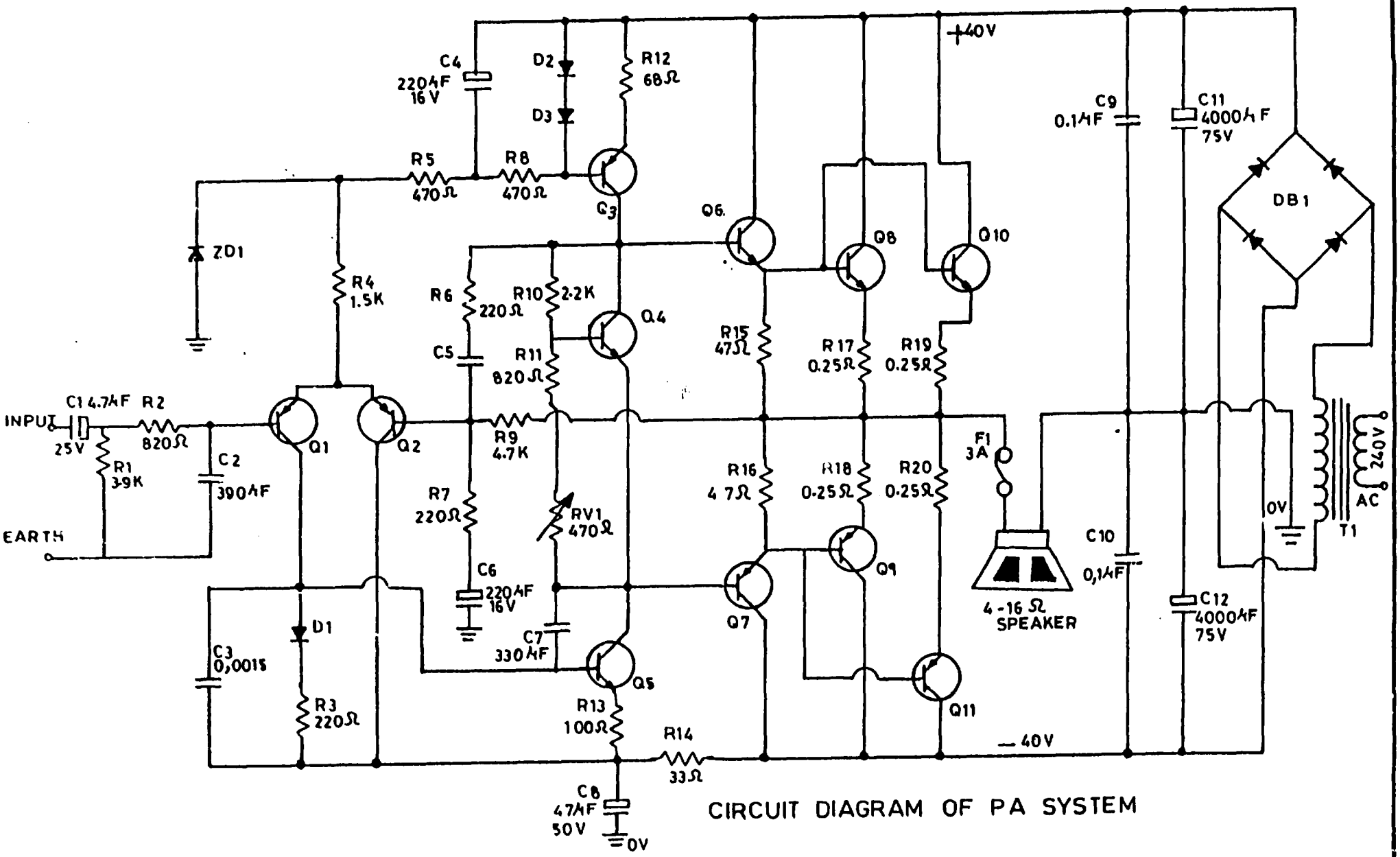


FIG. 1.



CIRCUIT DIAGRAM OF PA SYSTEM

FIG.2

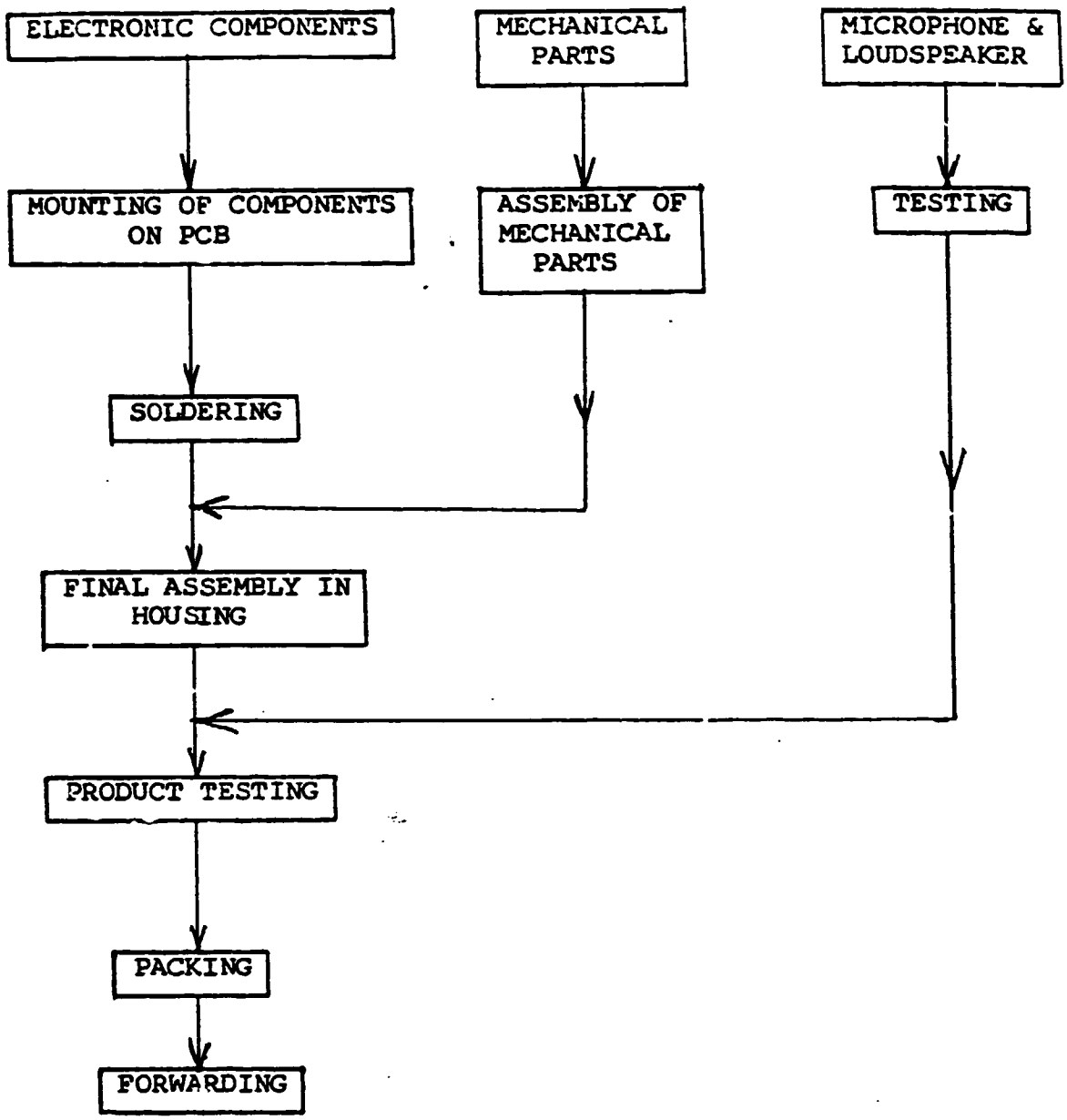

ELECTRONIC COMPONENTS
MECHANICAL PARTS
MICROPHONE & LOUDSPEAKER
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF MECHANICAL PARTS
TESTING
SOLDERING
FINAL ASSEMBLY IN HOUSING
PRODUCT TESTING
PACKING
FORWARDING

FIG.3

ANNEXURE

INDIA

1. Applied Electronics Limited
APLAB House
A-5, Wagle Indl. Estate
Thane 400604, Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi 110 019.

3. Philips India Limited
Annie Besant Road
Shiv Sagar Estate
Bombay.

4. Batliboi & Co. Limited
Jeevan Vihar Building
Sansad Marg
New Delhi 110 001.

5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road,
Chakala
Andheri(East)
Bombay 400 093.

OTHER COUNTRIES

7. Philips Intl.Bv.
Scientific & Indl. Equipment Div.
Dept. G,
TQ 111-4 Eindenhoven
Neitherlands.

8. Hewlett Packard Co.
5 Computer Drive
South Albany
New York 122 05, USA

9. Tektronix Inc,
Dept.G
P.O.Box 500
Y3-314 Beaverton Oregon - 97077
U.S.A.

.../2.

10. Gould Inst. Ltd
Design & Test System Division
Dept. G,
Rocbuck Road
Hainault Essex 1G63UE
UK

11. TRUMPF GmbH
STUTTGART
D-7257 - DITZINGEN_1
FRG

12. O.K. Industries Inc.
3455, Corner Street
New York 10475
U.S.A.

TV ANTENNAS PRODUCTION PLANT PROFILE

INTRODUCTION

A television receiver requires an antenna to intercept energy radiated from the transmitter. The directional relationship between the television receiving and transmitting antennas is critical.

The simplest type of television receiving antenna is a half-wave length dipole. It is the "basic" television antenna from which all other types are derived. By definition, a dipole antenna is a symmetrical antenna in which the two ends are at opposite potential relative to the midpoint. The dipole antenna is a metal rod that has a physical length approximating to one half-wave length in free space at the frequency of operation. This frequency is considered to be the resonant frequency of the antenna. The basic half-wave dipole antenna appears in two forms; as a continuous rod and as a rod that is split at the centre, each part being slightly shorter than one quarter-wave length.

The indoor antenna may take many shapes, most popular being upright V, also called rabbit ears. The arms are adjustable in length, to the best response, as seen on the picture tube screen. The indoor antenna provides relatively poor performance when compared to conventional antennas. It is used only where TV signals are strong and an outdoor type cannot be installed.

Line diagram of a common TV antenna is shown in Fig.1.

SPECIFICATIONS (TYPICAL)

Band Width	: 7 MHz
Impedence	: 73 Ohms

.../:

MARKET

The market for television antennas is directly related to the production programme of television receivers which is, however, dependent on factors like (1) expansion programme of TV broadcast/service, (2) retail price of TV sets, and (3) availability of quality of TV programmes. Incidentally, TV is no more considered as a luxury item even for developing countries in view of the following;

1. It is a powerful media for popularising science and technology and new programmes like family planning, national integration, etc.
2. It is a powerful tool for spreading education including adult education.
3. It is perhaps the cheapest source of entertainment when combined with VCR.

MANUFACTURING PROCESS

The manufacturing process of television antennas starts with the purchase of raw materials/parts. Basically, the manufacturing process consists of machine operations and assembly of the various machined and bought out parts.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 15,000 Nos. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Multimeters (3½ digit)
2. TV set (20", colour and Black & White)
3. Signal Generator (10-300 MHz)
4. R.F.Millivoltmeter (300 MHz, 1V)
5. Bending Machine
6. Hexa Machine
7. Plier (Adjustable)
8. Nose Plier
9. Spanner Set
10. Set of Keys
11. Drilling Machines

FOB price of machinery and equipment: US$ 5,000 (approx).

..../3.

REQUIRED RAW MATERIALS

1. Antenna Pipe
2. Dipole
3. Reflector
4. Director Pole
5. Clamps, nuts and bolts
6. Plastic enclosure for connecting wire.

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electricity	: 15 KVA
Power consumption/month	: 1700 KWH

REQUIRED MANPOWER

Managerial/Entrepreneur	: 1
Supervisory	: 1
Skilled Workers	: 2
Semi-skilled Workers	: 4
Administration/Accounts	: 2
	10

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

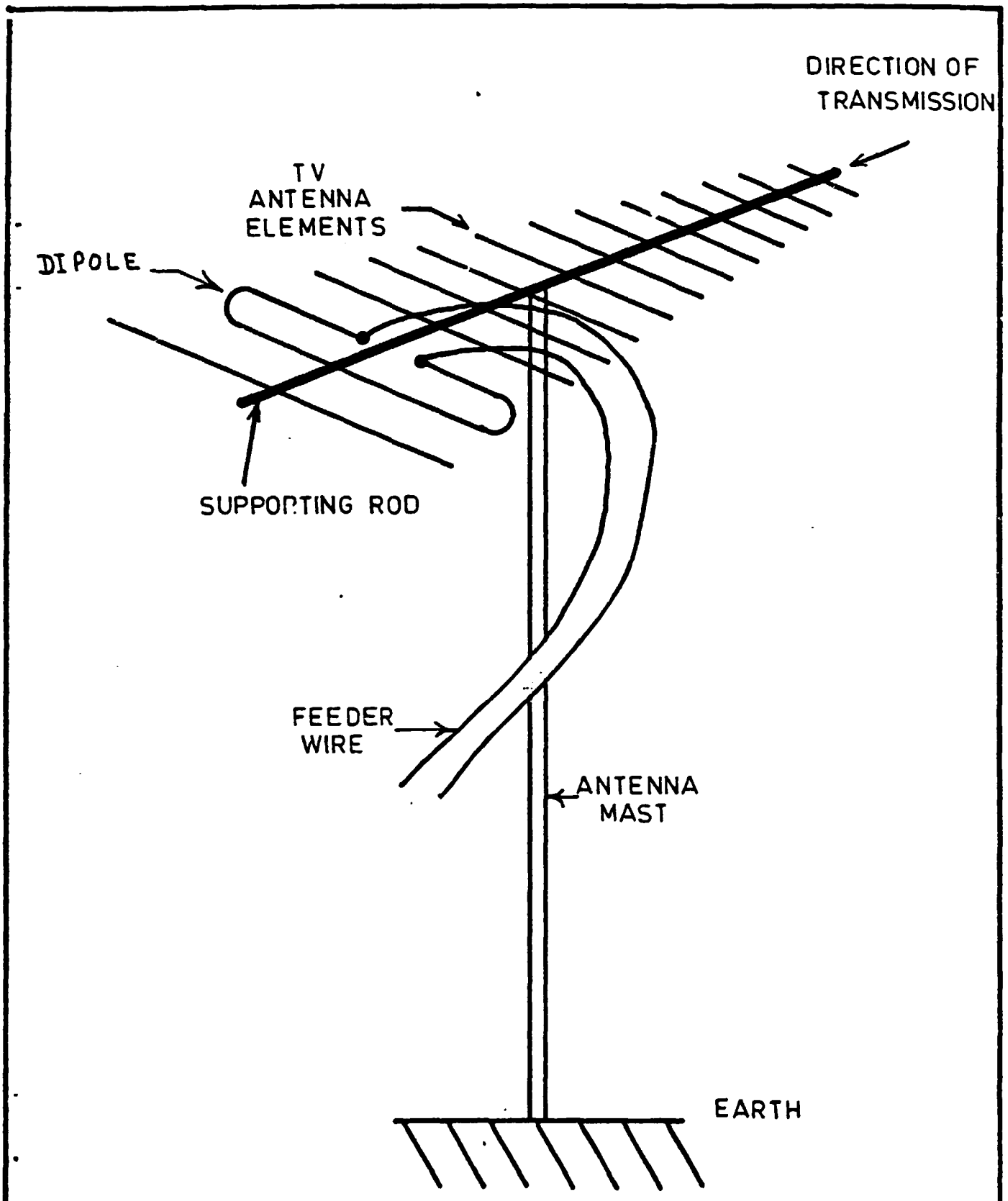
Process Flow is shown in Fig.2.

LOCATIONAL CONDITIONS

The location for the manufacture of television antennas is dependent mainly on the TV market. As television antenna is a low cost high volume item, transportation of the product to vary far off market is not economically feasible. Therefore, a location near a big city will be a logical choice.

DIVERSIFICATION PROGRAMME

Once the unit is fully established, other mechanical items like TV and radio chasis, cabinets for stabilisers, etc. can also be taken up utilising almost the same production facilities and marketing network.



A DIAGRAMATIC VIEW OF THE TV ANTENNA SYSTEM

FIG.1

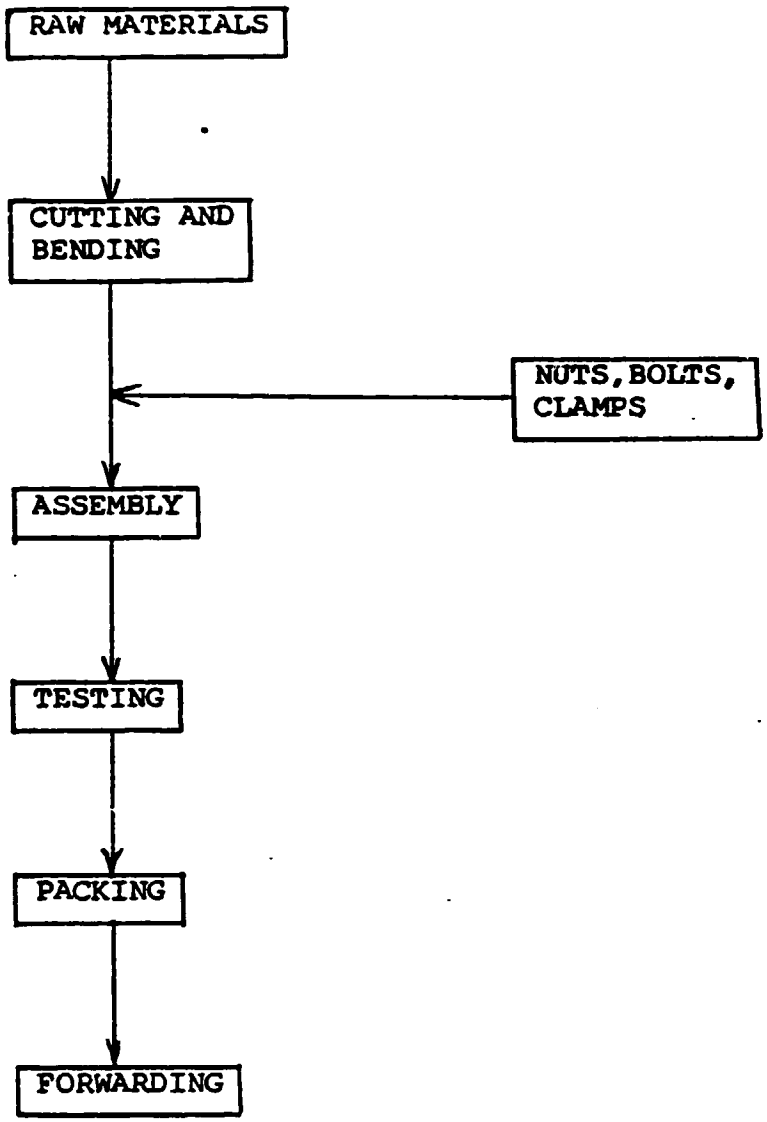

RAW MATERIALS
CUTTING AND BENDING
NUTS, BOLTS, CLAMPS
ASSEMBLY
TESTING
PACKING
FORWARDING

FIG. 2

ANNEXURE

INDIA

1. Applied Electronics Limited
APLAB House
A-5, Wagle Indl.Estate
Thane 400604, Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
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New Delhi 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road
Chakala
Andheri (East)
Bombay 400 093.

OTHER COUNTRIES

7. Philips Intl Bv,
Scientific & Indl. Equipment Div.
Dept.G,
TQ 111-4 Eindenhov
Neitherlands.

8. Hewlett Packard Co.
5 Computer Drive
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New York 122 05, USA

9. Te. tronix Inc,
Dept.G
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USA.

..../2.

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Design & Test System Division
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Hainault Essex 1G63UE
UK

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STUTTGART
D-7257 - DITZINGEN-1
FRG.

12. O.K.Industries Inc.
3455, Corner Street
New York 10475
U.S.A.

ELECTRONIC FAN REGULATORS & DIMMERSTATS PRODUCTION PLANT PROFILE

INTRODUCTION

Electronic fan regulators and dimmerstats are solid state devices which provide continuous stepless variation of power without use of transformers or switches, which in turn vary the speed of motors or light intensity of lamps. Electric fan regulators and dimmerstats are relatively a new concept for the variation of voltage and current in an electric circuit. Because of controlled dissipation of power, the electrical losses are minimised, thus reducing the electricity consumption when used in electrical appliances/ equipment.

The line diagram and circuit diagram of a typical fan regulator are shown in Fig. 1 & 2 respectively.

SPECIFICATIONS (TYPICAL)

Fan Regulators

Output : 40 to 50 W

Dimmerstats

Output : 50 to 1000 W

MARKET

These items are to be used as a substitute for electro-mechanical regulators which are currently in use but are much less efficient than solid state speed regulators and light dimmers. In view of the low power losses, high reliability and longer life, total substitute is around the corner.

..../2.

As a fan regulator, it has applications in regulating the speed of;

1. Ceiling Fans
2. Table Fans
3. Exhaust Fans
4. Coolers
5. Universal Motors

As Dimmerstat, it is used to regulate the intensity of light wherever necessary.

ASSEMBLY OPERATION

Electronic components such as diacs, triacs, resistors, capacitors, coils, etc. are mounted and soldered on PCB. The output from diac and triac is connected to a potentiometer which acts as voltage regulator.

This is tested for various voltage drops at different settings of potentiometer. The PCB assembly is finally fixed in a plastic box.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day, and 300 days per year, annual capacity of the plant is proposed to be 25,000 nos of fan regulators and 15,000 nos of light dimmerststs. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment,space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Variacs (0 to 260 V)
2. Multimeters (3½ digit)
3. Power Supplies (0 to 30V, 2A)
4. Oscillioscopes (0 to 15 MHz)
5. Stabilisers (1.1 KV, 200-240 V)
6. Soldering Irons
7. Desoldering Pumps
8. Nose Pliers
9. Tweezers
10. Cutters
11. Screw Driver set
12. Drilling Machines
13. Bench Grinder
14. Work Benches

..../3.

FOB(India) price of machinery & equipment: US$ 10,000 (approx)

REQUIRED RAW MATERIALS AND COMPONENTS

1. Diacs and Triacs
2. Capacitors
3. Resistances
4. Potentiometers
5. PCBs
6. Coils
7. Soldering Wire
8. Flux
9. Main lead, connecting wires etc.
10. Knobs

SOURCES OF SUPPLY

All the equipment, raw materials and components are available in India. These can also be procured from other countries like UK, West Germany, USA, Japan, etc. Some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 20 KVA
Power consumption/month	: 2200 KWH

REQUIRED MANPOWER

Production	: 1
Marketing & Purchase Manager	: 1
Marketing/Purchase Assistant	: 2
Testing and Inspection	: 1
Skilled Workers	: 6
Semi-skilled Workers	: 3
Unskilled Workers	: 2
Administration & Accounts	: 4
	20

..../4.

REQUIRED AREA FOR PLANT SITE

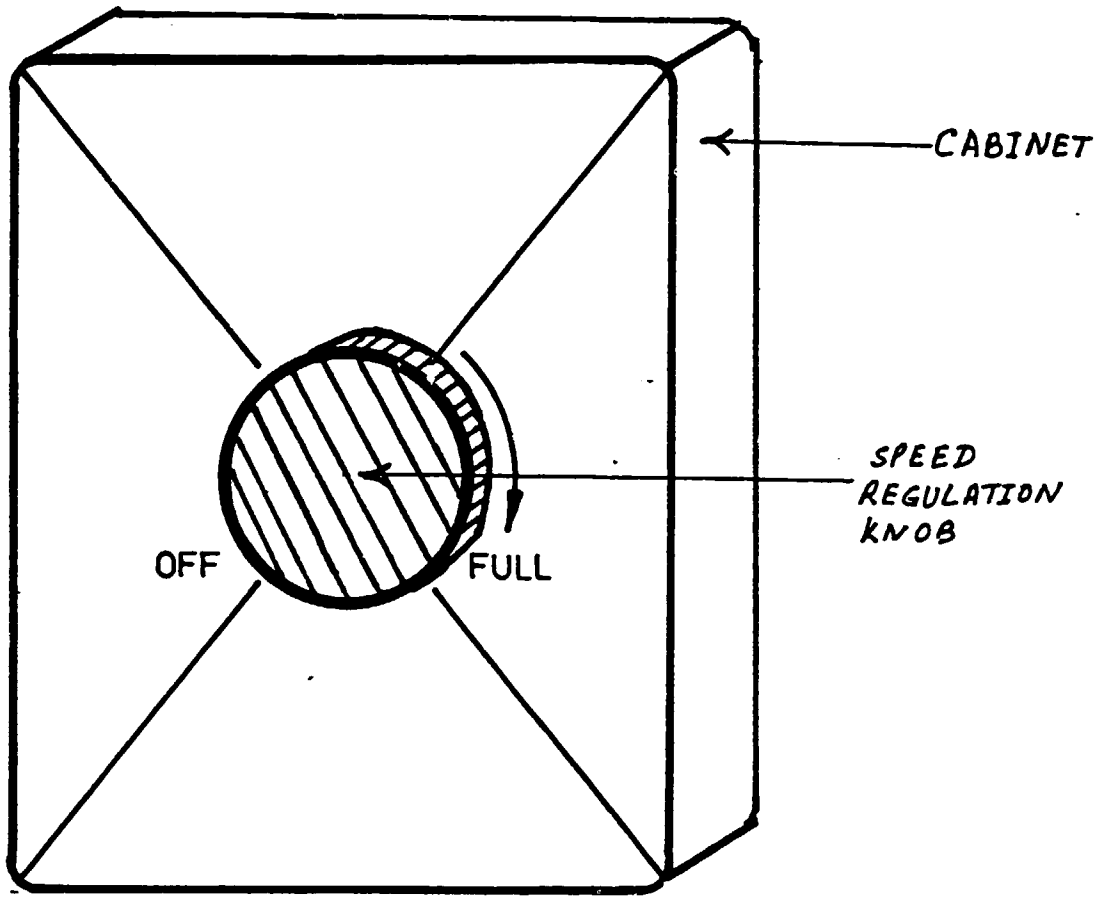
Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

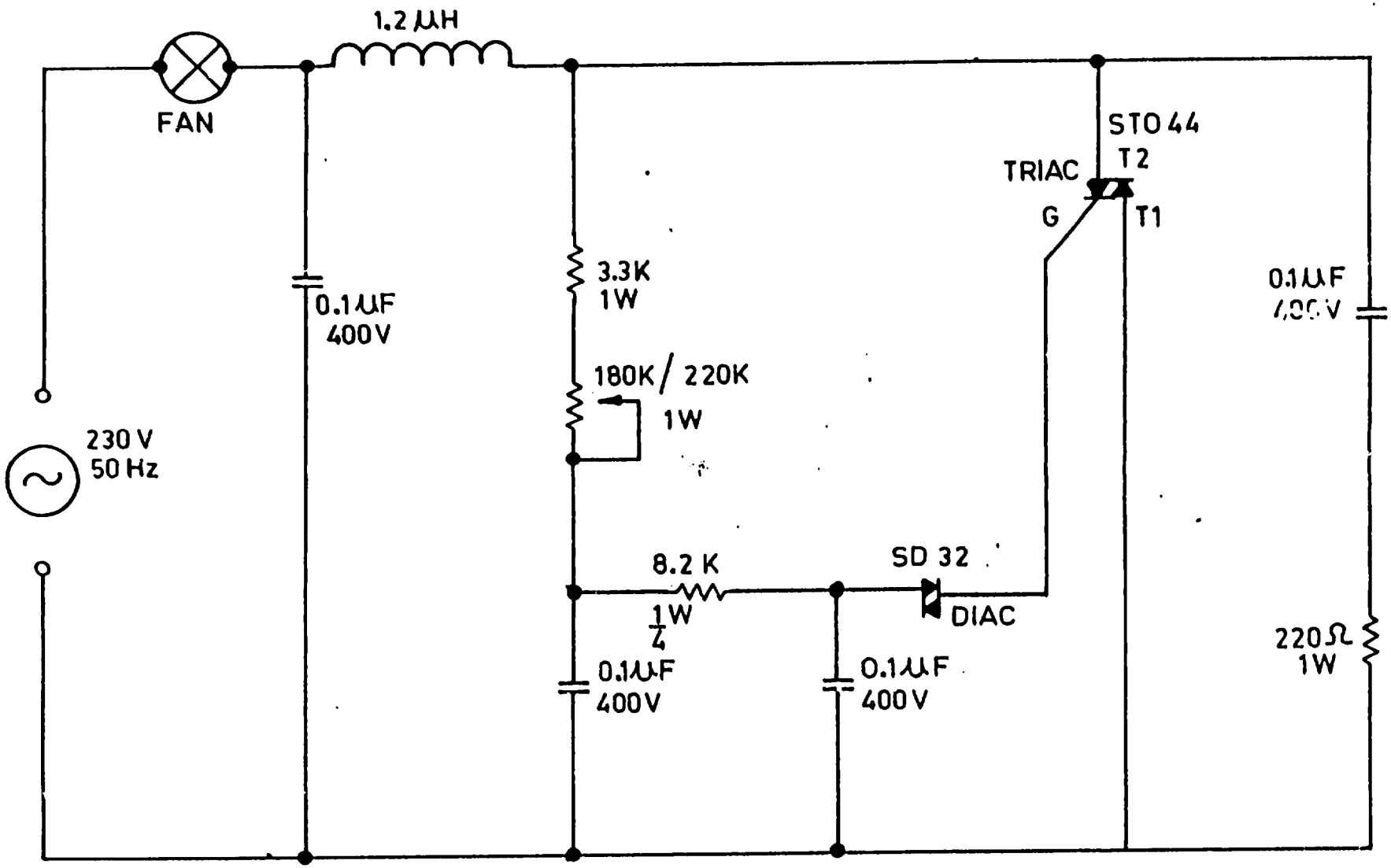
LOCATIONAL CONDITION

Since the item is to be used with other electrical appliances/equipment, the proposed unit should be close to the units manufacturing fans, air coolers, etc. The unit should preferably be also close to big cities as these items will find applic tions in hotels, clubs, hospitals and residential buildings.



ELECTRONIC FAN REGULATOR

FIG. 1.



CIRCUIT DIAGRAM FOR FAN REGULATOR

FIG-2.

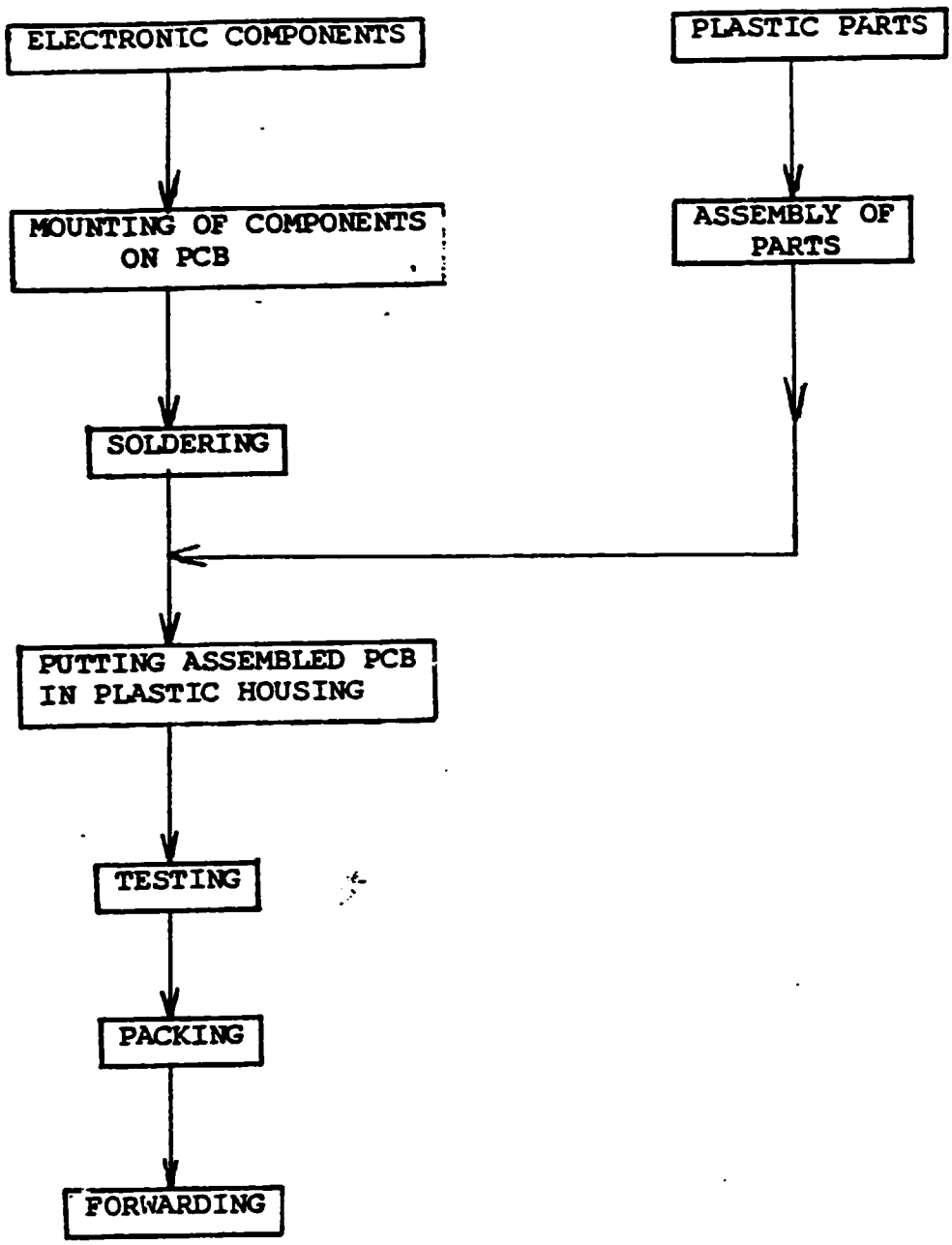

ELECTRONIC COMPONENTS
PLASTIC PARTS
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF PARTS
SOLDERING
PUTTING ASSEMBLED PCB IN PLASTIC HOUSING
TESTING
PACKING
FORWARDING

FIG.3

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Hainault Essex 1G63UE
UK

11. TRUMPF GmbH
STUTTGART
D-7257 - DITZINGEN-1
FRG

12. O.K. Industries Inc.
3455, Corner Street
New York 10475
U.S.A

EMERGENCY LIGHTS PRODUCTION PLANT PROFILE

INTRODUCTION

As the name suggests, this source of light acts as an emergency aid whenever the electrical power from the main supply system gets disrupted with or without prior warning. The emergency light thus eliminates the risk of sudden darkness.

Emergency light operates automatically whenever there is a power failure. The present day models use solid state circuitry which acts as a battery charger circuit as well as a switch to put the light on as soon as power goes off. Emergency light consists of an electronic control circuit , a heavy duty rechargeable battery and an indicator lamp. Some models also incorporate switches for controlling the intensity of the light.

The line and circuit diagrams of a typical emergency light are shown in Fig.1 and 2 respectively.

SPECIFICATIONS(TYPICAL)

Output power	: 20W (Flouroscent Tube)
Duration of illumination	: 4 hours
Battery (storage) rating	: 6V
Battery over-charge/under-charge protection	: Optional

MARKET

Emergency light as is obvious from its name finds many applications in today's environments particularly in developing countries where quite often continuous power supply is uncertain.

..../2.

It finds use at cash counters, cinema houses, clubs, auditoriums, operation theatres, clinics, show rooms and residences. In an ideal situation, every place which uses electricity for lighting the premises must use this light to prevent mishaps when the electricity suddenly goes off. However, there are some locations where requirement is a must. There are other applications like households, where its use is optional thus its purchase would depend upon the income of the household.

ASSEMBLY PROCESS

The process of manufacture/assembly of the emergency lights involves following stages;

1. Electronic Assembly

The electronic control circuitry is the heart of the emergency light. It ensures that the device is safe, foolproof and has a minimum drainage on the life of the battery. Once a satisfactory circuit has been designed and tested, this aspect of manufacture/assembly can be undertaken by semi-skilled workers.

Tested components are stripped off insulation for proper contact. The components with proper lead lengths are then placed on top of the degreased printed circuit board. These are in turn soldered. Connected PC Board is then tested for performance. After the components are soldered, switches, fuses and the leads are connected to the circuit board. The assembly is tested.

2. Housing Assembly

Housing can be either metallic or plastic or a combination thereof. Housing assembly consists of a steel lamp holder, reflector and glass/plastic shield for the lamp. Two leads coming out of the housing are connected to the battery and the AC mains.

It is normally the practice of emergency light manufacturers to obtain components or parts for the housing assembly from outside vendors. This is done to reduce the investment on machinery and also to reduce the space requirements.

3. Final Assembly

After the housing assembly is built from the bought out components, the printed circuit board is placed in the housing, the leads are connected to the lamp holder which

..../3.

is fitted with a reflector and the shield. The glass shield is provided with plated trimming or a ring for aesthetic purposes. Depending upon the design, clamps are provided if unit is wall mounted type. A touch of paint, if necessary, is also given.

Testing

The light is tested for (i) switching on at power disruption, (2) charging of battery, and (3) duration of the light. If satisfactory, it is sent to despatch after packing.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 10,000 pieces. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Variacs (0 to 260 V)
2. Multimeters
3. Power Supplies (0 to 30V 2 Amp)
4. Oscillioscopes (0 to 15 MHz)
5. Stabiliser (1.1 KV, 200-240 V)
6. Soldering Irons
7. Desoldering Pumps
8. Nose Pliers
9. Tweezers
10. Cutters
11. Screw Driver set
12. Work benches

FOB(India) price of machinery & equipment:US$ 10,000(appro

REQUIRED RAW MATERIAL AND COMPONENTS

1. Tube (20W)
2. Transistors
3. Invertors
4. Resistances
5. Capacitors
6. PCBs
7. Battery (6V)

..../4.

8. Rectifier
9. Transformers
10. Soldering Wire
11. Flux
12. Power Cords and connecting wires
13. Mechanical chasis

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA etc. Some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 20 KVA
Power consumption/month	: 2200 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing & Purchase Manager	: 1
Marketing/Purchase Assistant	: 2
Testing and Inspection	: 2
Skilled Workers	:12
Semi-skilled Workers	: 8
Unskilled Workers	: 2
Administration & Accounts	: 6
	34

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

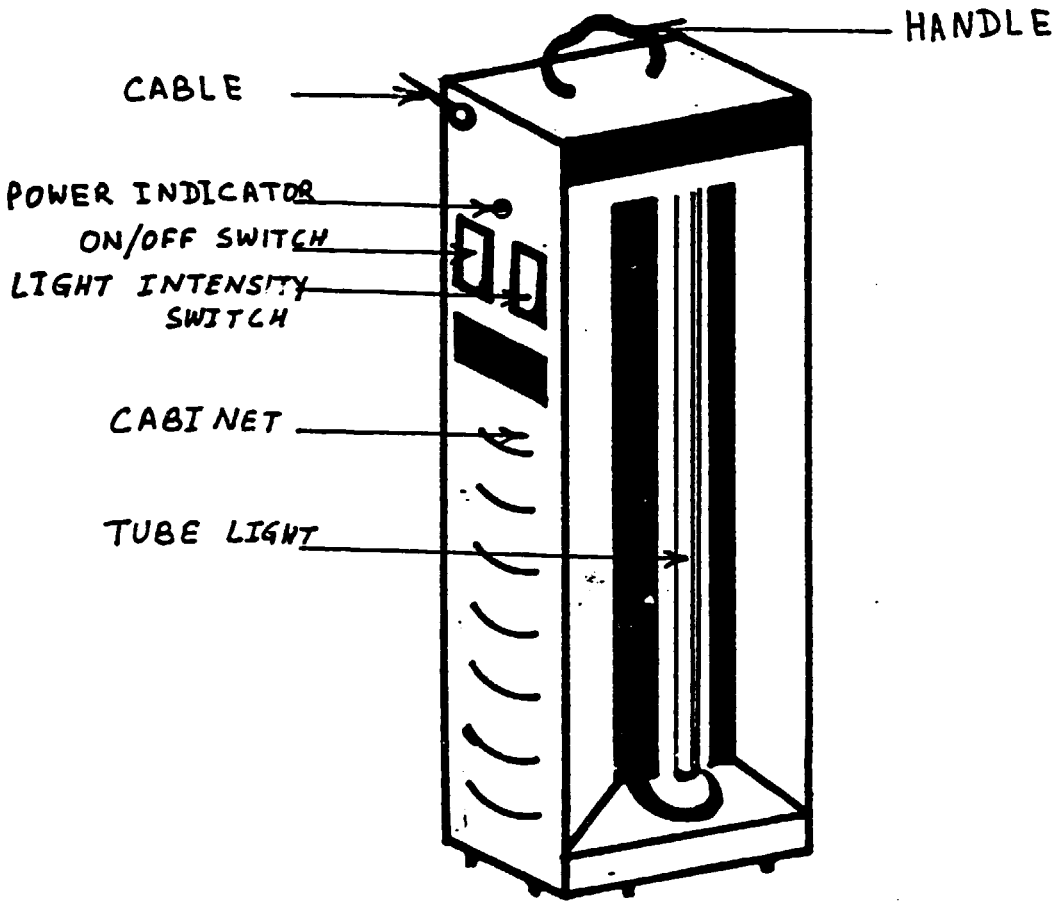
Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of Emergency Lights. They can be assembled in any moderately clea surroundings. Building should preferably be of RCC structure to minimise dust. Further, the factory should be situated close to big cities where the item is likely to have greater demand.

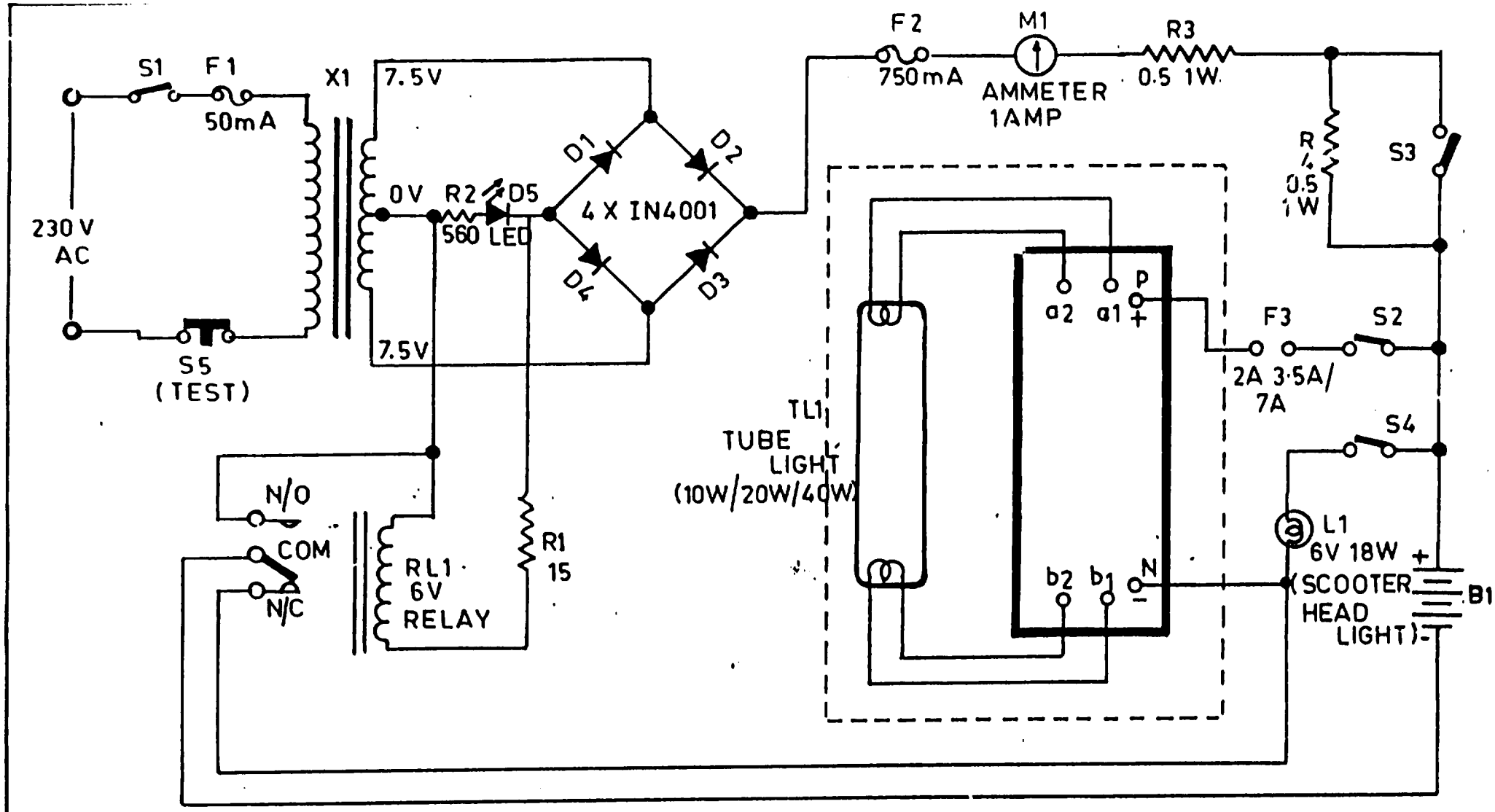
DIVERSIFICATION PROGRAMME

Once the unit is fully operational, Battery charger can also be produced utilising almost the same production facilities and marketing network.



EMERGENCY LIGHT

FIG. 1.



CIRCUIT DIAGRAM FOR THE AUTOMATIC EMERGENCY LIGHT

FIG.2

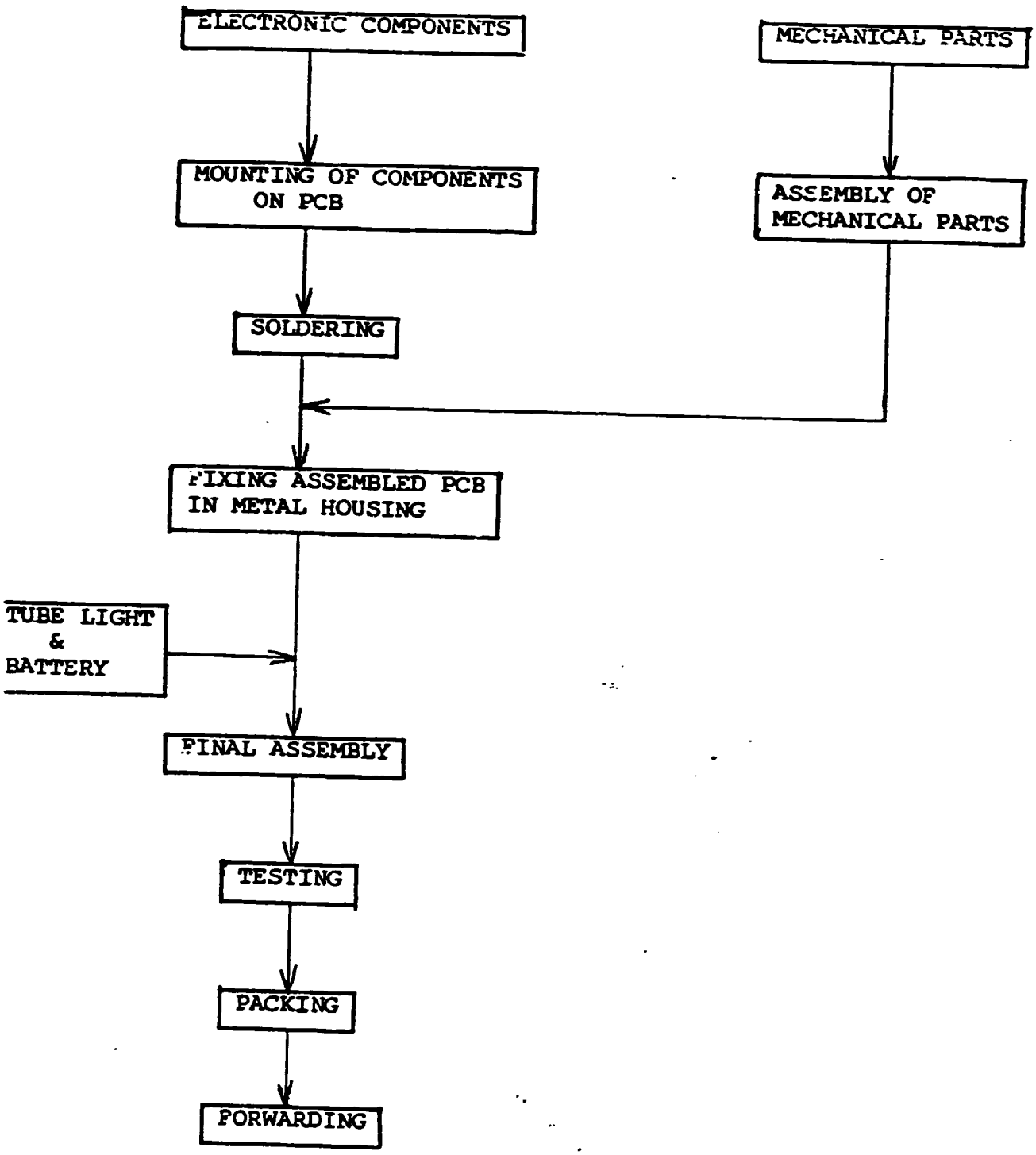

ELECTRONIC COMPONENTS
MECHANICAL PARTS
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF MECHANICAL PARTS
SOLDERING
FIXING ASSEMBLED PCB IN METAL HOUSING
TUBE LIGHT & BATTERY
FINAL ASSEMBLY
TESTING
PACKING
FORWARDING

FIG.3

ANNEXURE

INDIA

1. Applied Electronics Limited
APLAB House
A-5, Wagle Indl. Estate
Thane 400604, Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi 110 019

3. Philips India Limited
Annie Besant Road
Shiv Sagar Estate
Bombay.

4. Batliboi & Co.Limited
Jeevan Vihar Building
Sansad Marg
New Delhi 110 001.

5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road,
Chakala
Andheri (east)
Bombay 400 093.

OTHER COUNTRIES

7. Philips Intl Bv,
Scientific & Indl. Equipment Div.
Dept. G,
TQ 111-4 Eindenhoven
Neitherlands.

8. Hewlett Packard Co.
5 Computer Drive
South Albany
New York 122 05, USA

9. Tektronix Inc,
Dept.G
P.O.Box 500
Y3-314 Beaverton Oregon - 97077
USA.

..../2.

10. Gould Inst. Ltd
Design & Test System Division
Dept. G,
Rocbuck Road
Hainault Essex 1G63UE
UK

11. TRUMPF GmbH
STUTTGART
D-7257 - DITZINGEN_1
FRG.

12. O.K. Industries Inc.
3455, Corner Street
New York 10475
U.S.A.

VOLTAGE STABILISERS PRODUCTION PLANT PROFILE

INTRODUCTION

Excessive voltage variation is a constant hazard to electronic and electrical equipment. The automatic voltage stabiliser adjusts excessively high or low voltages into the desired voltage necessary for the operation of the equipment. If there is any variation in the line voltage, it provides an output voltage at a predetermined level. Voltage stabiliser yields an accurate constant voltage, independent of the load power factor. Further, harmonic distortions are minimised. Photograph and circuit diagram of a typical voltage stabiliser are shown in Fig. 1 and 2 respectively.

SPECIFICATIONS(TYPICAL)

Input Voltage	: 160 - 250 Volts, AC
Output Voltage	: 230 $\pm$ 7.5% Volts, AC
Frequency	: 50 Hz
Capacity	: 0.5 KVA & 0.25 KVA

MARKET

Voltage stabilisers are mainly used for stabilising input voltage to costly domestic and other electronic and electrical equipment like TVs, refrigerators, desert coolers, air conditioners etc. in order to avoid damage due to low or high voltages. Thus, the demand of voltage stabilisers depends on the use of these appliances and equipment. In view of gradual rise in the standard of living in developing countries, the demand of TVs, refrigerators, etc. is bound to increase, thus increasing the demand for voltage stabilisers as well.

..../2.

MANUFACTURING PROCESS

It is proposed to purchase all the components from outside and assemble them together. The assembly of voltage stabilisers involve mounting and soldering of electronic components on a PCB, final assembly in a metal housing, testing and packing. Before putting the components on PCB, they are sample tested so as to ensure that they meet required specifications.

PROUDCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity is proposed to be 10,000 nos. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Variacs (0 to 260V)
2. Multimeters (3½ digits)
3. Power Supplies (0 to 30V, 2A)
4. Stabilisers (1.1 KVA, 200-240 V)
5. Soldering Irons
6. Desoldering Pumps
7. Drilling Machine
8. Nose Pliers
9. Tweezers
10. Cutters
11. Screw Driver sets
12. Work benches

FOB(India) price of machinery & equipment: US$ 10,000 (approx)

REQUIRED RAW MATERIALS AND COMPONENTS

1. Auto Transformers
2. Transistors
3. Capacitors
4. Resistors
5. Diodes

..../3.

6. Relays
7. PCBs
8. Voltmeters
9. Potentiometers
10. Neon Lamp
11. Mechanical Chasis
12. Switches and Sockets
13. Solder Wire
14. Flux
15. Hardware i.e. screws, bolts, nuts, etc.
16. Misc items like connecting wires, power cord, fuses, etc.

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be purchased from other countries like UK, West Germany, Japan, USA, etc. Some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electricity	: 20 KVA
Power consumption/month	: 2200 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing & Purchase Manager	: 1
Marketing/Purchase Assistant	: 1
Testing & Inspection	: 1
Skilled Workers	: 4
Semi-skilled Workers	: 4
Unskilled Workers	: 2
Administration/Accounts	: 4
	20

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

..../4.

LOCATIONAL CONDITIONS

It is suggested that the unit should be near a big city in order to reduce the cost of transportation of finished goods as most of the stabilisers find applications for refrigerators and TVs, used in cities and urban areas.

DIVERSIFICATION PROGRAMME

Once the unit is fully established, power supplies can also be produced utilising almost the same production facilities.

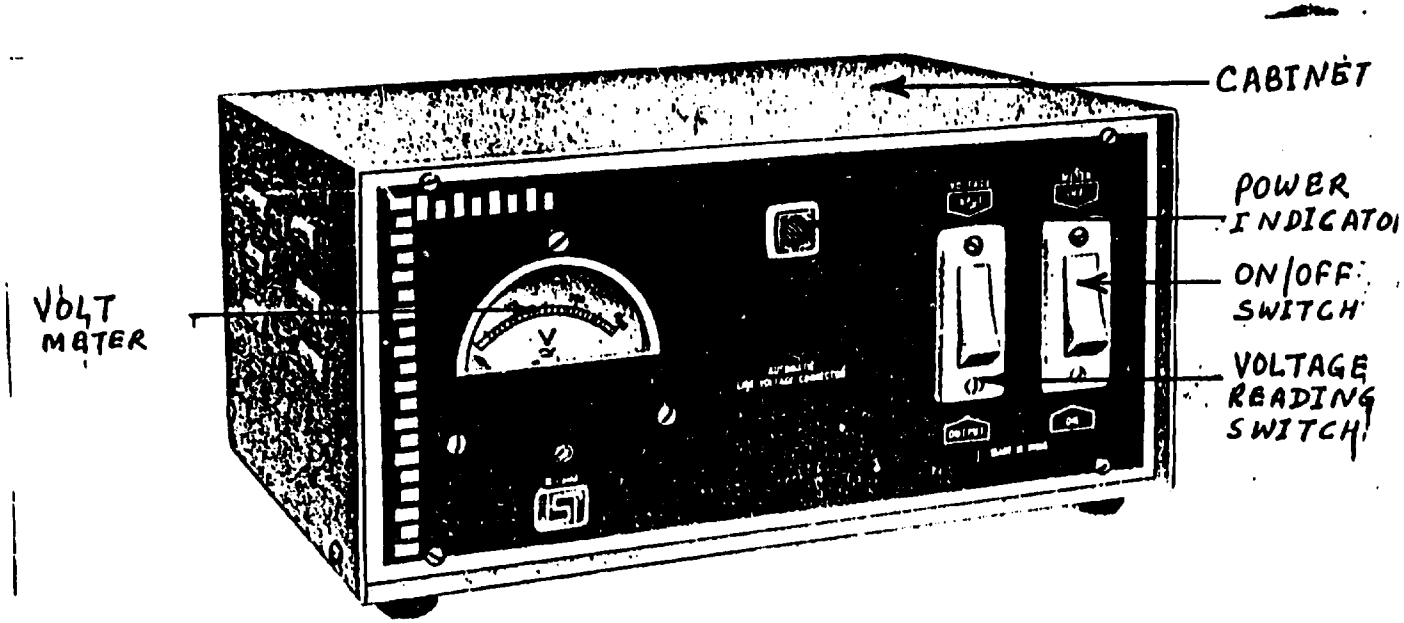
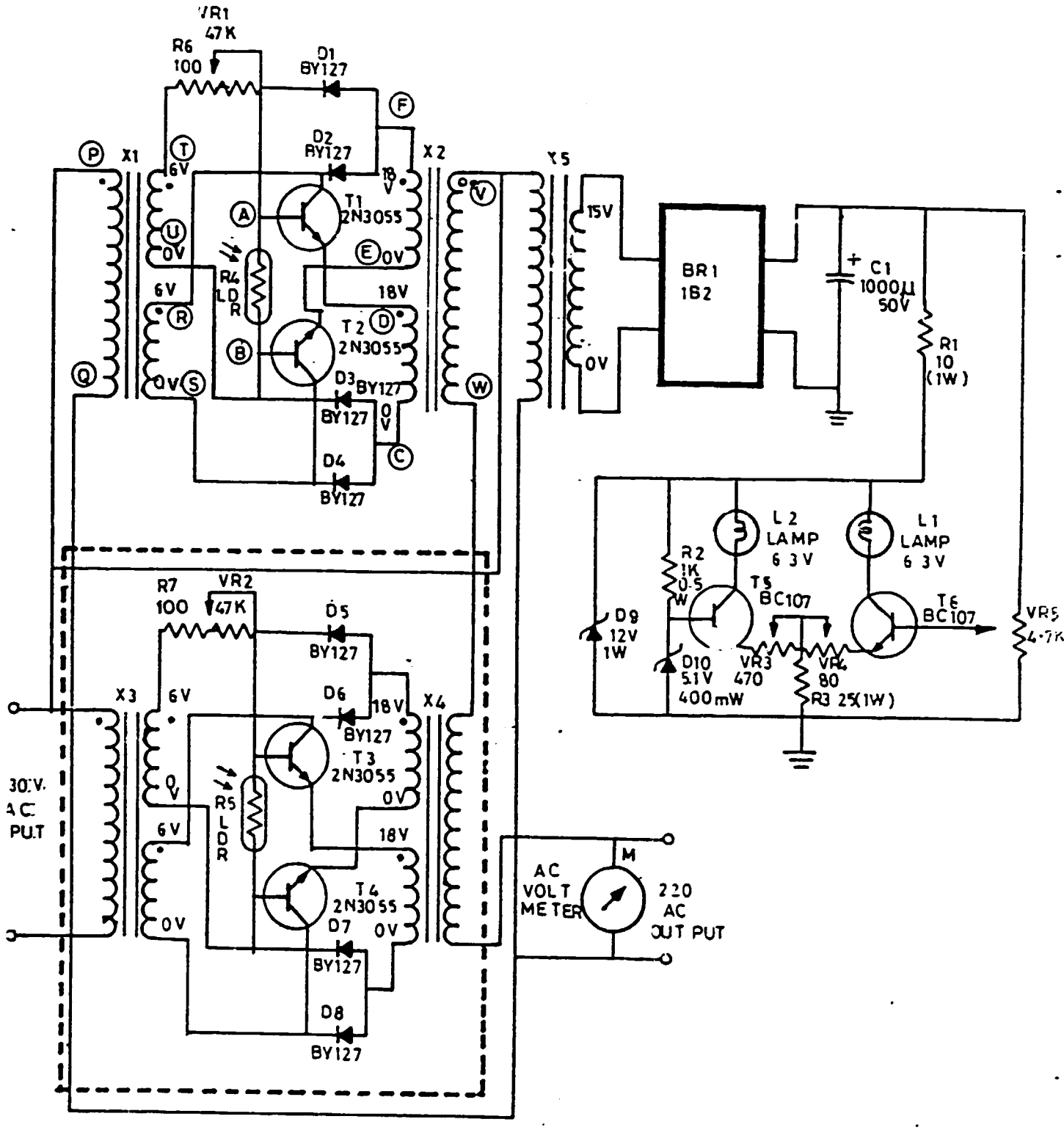

CABINET
POWER INDICATOR
ON/OFF SWITCH
VOLTAGE READING SWITCH
VOLT METER

FIG-1



CIRCUIT DIAGRAM FOR SOLIDSTATE AUTOMATIC VOLTAGE REGULATOR

FIG. 2.

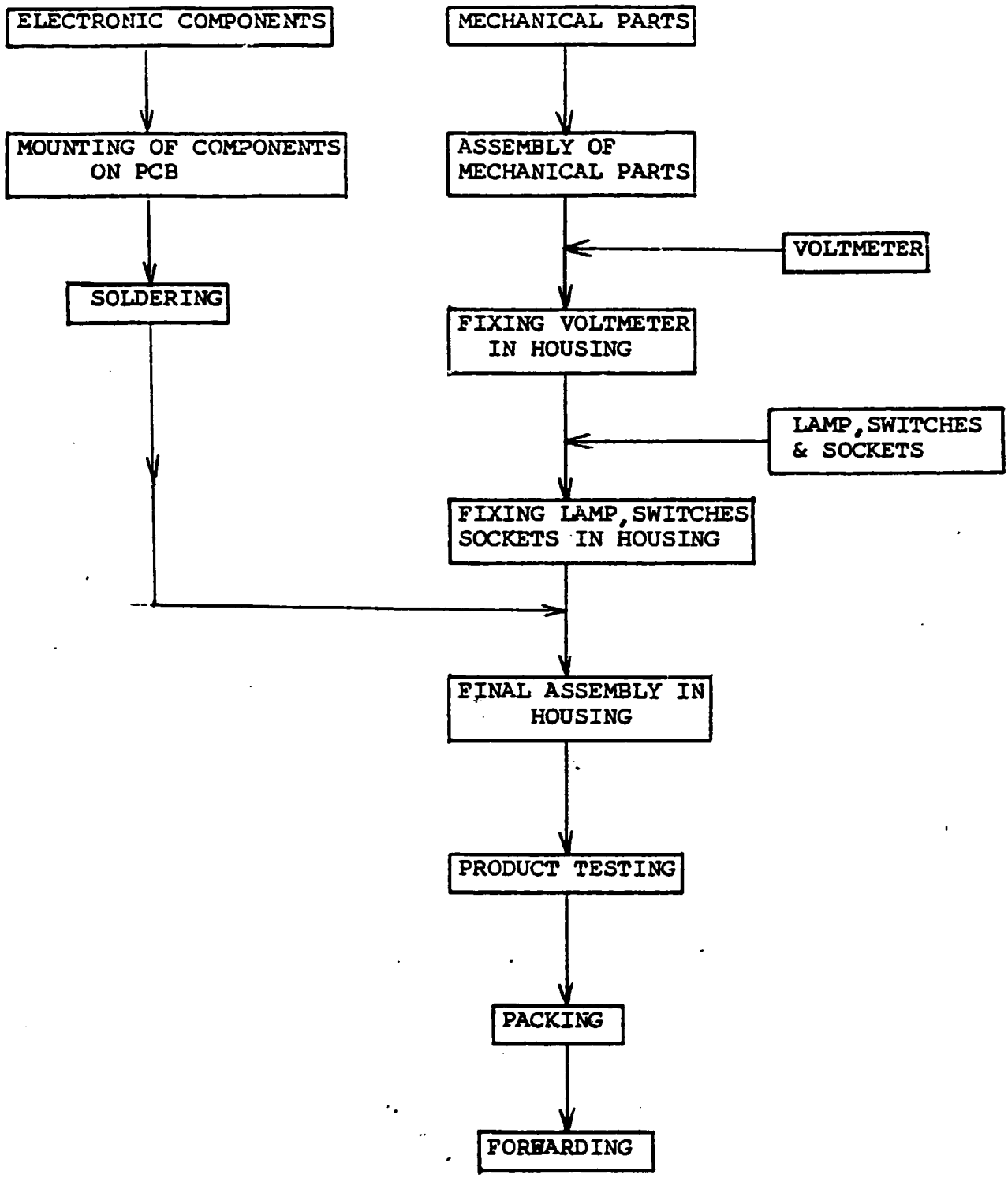

ELECTRONIC COMPONENTS
MECHANICAL PARTS
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF MECHANICAL PARTS
VOLTMETER
SOLDERING
FIXING VOLTMETER IN HOUSING
LAMP, SWITCHES & SOCKETS
FIXING LAMP, SWITCHES SOCKETS IN HOUSING
FINAL ASSEMBLY IN HOUSING
PRODUCT TESTING
PACKING
FORWARDING

FIG. 3

ANNEXURE

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6. The National Radio & Electronics Co.Limited
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Chakala
Andheri (East)
Bombay 400 093.

OTHER COUNTRIES

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South Albany
New York 122 05, USA

9. Tektronic Inc,
Dept. G
P.O. Box 500
Y3-314 Beaverton Oregon - 97077
USA.

.../2.

10. Gould Inst.Ltd
Design & Test System Division
Dept. G,
Rocbuck Road,
Hainault Essex 1G63UE
UK

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STUTTGART
D-7257 - DITZINGEN-1
FRG

12. O.K.Industries Inc.
3455, Corner Street
New York 10475
U.S.A.

ELECTRONIC WORKSHOP/SHOP FOR SERVICING/REPAIR PROFILE

INTRODUCTION

With a great upsurge in the demand for electronic goods like radios, TVs, electro-medical equipment etc. both for consumer and professional use, the demand for their repairs and maintenance is on the increase. So many cases are known of helpless consumers who get cheated by unscrupulous repairmen. Thus, there is a need for professional service centres, where one could get a reliable service at reasonable price.

MARKET

The demand for various entertainment and other electronic equipment is continuously increasing A service centre could thus provide repair and servicing facilities for TVs, stereos, radios, two-in-ones, record players, VCRs/VCPs, calculators, electronic typewriters etc. If professional services can be provided where the consumer does not feel that he has been taken for a ride and the service is provided promptly, the scheme should have very good prospects. There may have to be a central office in a region which registers all the complaints and sends service technicians to attend to them. Another service station where specific or more complex repairs are undertaken may have also to be set up.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, the workshop is expected to cater to the repair of the following equipment annually;

	Nos per annum
1. TVs(Colour & B/W)	3000
2. Stereos,amplifiers, etc.	1000
3. Radios, two-in-ones, record players	3000
4. Office equipment like calculators,typewriters,etc.	3000

..../2.

However, the above equipment mix could vary depending upon the local requirements.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscope (0-10 MHz)
2. Power Supplies (0-30V, 2A)
3. Multimeters (3½ digit)
4. PatternGenerator
5. Signal Generator
6. Audio Generator
7. VTVM with H.T.Probes
8. Voltage Stabilisers
9. Soldering irons
10. Drill machine
11. Hand tools

FOB(India) price of machinery & equipment: US$ 40,000 (approx)

REQUIRED RAW MATERIAL AND COMPONENTS

It will be necessary to maintain an inventory of electronic components which are general in nature. Some of the major components to be stored are;

1. Capacitors
2. Resistors
3. Diodes
4. Transistors
5. Speakers
6. Hardware items

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 25 KVA
Electricity consumption/month	: 2800 KWH

REQUIRED MANPOWER

Engineers	: 2
Skilled Technicians	: 16
Semi-skilled Workers	: 6
Unskilled Workers	: 2
Administration & Accounts	: 4
	30

..../3.

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

LOCATIONAL CONDITIONS

There are no special requirements for electronic workshop/shop for servicing/repairs. The building should be preferably of RCC structure to minimise dust. Further, it should be situated close to urban areas where the need for such workshops exists.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, the jobs of repair of electro-medical equipment and process control systems can also be taken up utilising almost the same facilities.

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
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Thane - 400 604
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi - 110 019.

3. Phillips India Limited
Annie Besant Road
Shiv Sagar Estate
Bombay.

4. Batliboi & Co. Limited,
Jeevan Vihar Building
Sansad Marg,
New Delhi - 110 001.

5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi - 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road, Chakala,
Andheri (East)
Bombay - 400 093.

OTHER COUNTRIES

7. Phillips Intl Bv,
Scientific & Indl.Equipment Div.
Dept. G,
TQ111-4 Eindenhoven
Neitherlands.

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
New York-12205
USA

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...2/.

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Design & Test System Division
Deptt.G. Rocbuck Road,
Hainault Essex 1G63UE
UK

11. M/s TRUMPF GMBH
STUTTGART
D-7257 - DITZINGEN - 1
FRG

12. O.K.Industries INC.
3455, Corner Street
New York - 10475
U.S.A.

TEMPERATURE CONTROLLER PRODUCTION PLANT PROFILE

INTRODUCTION

A temperature controller plays an important role in the field of process control instrumentation. The electronically operated temperature controller is very accurate and withstands large temperature variations. The device consists of a temperature sensing element and a low frequency amplifier followed by a power amplifier. The output of the amplifier is connected to a relay system which in turn controls the temperature.

A photograph and a block diagram of a typical temperature controller are shown in Fig. 1 and 2 respectively.

SPECIFICATIONS (TYPICAL)

Temperature Range	: 0 to 450°C
Accuracy	: ± 1°C
Resolution	: 1°C
Display	: Analogue/Digital
Sensor	: Thermocouple, K type.

MARKET

Temperature controllers find wide usage in process industry, furnaces, air-conditioning plants, etc. With the increase in manufacturing activities and the standard of living /in developing countries, the demand for temperature controllers is bound to increase. However, to ensure sales, the manufacturer should preferably tie-up with the companies manufacturing air-conditioners, air-conditioning plants, furnaces and process control instruments, etc.

ASSEMBLY PROCESS

The electronic components are mounted and soldered on printed circuit boards. The sub-assemblies are tested for frequency response, output power, distortion etc. These are then assembled into main assembly. The main assembly is tested for operation under various temperature ranges and the output is calibrated.

..../2.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 10,000 nos of temperature controllers. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscopes (0 to 15 MHz)
2. Power Supplies (0 to 30V, 2A)
3. Standard Temperature Source(0-500°C)
4. Stabilizers (1.1 KVA, 200-240V)
5. Multimeters (3½ digit)
6. Variacs (0 to 260V)
7. Soldering irons
8. Drilling machine
9. Hand tools like nose plier, tweezer, cutter, screw driver set etc.

FOB(India) price of machinery & equipment: US$ 50,000 (approx)

REQUIRED RAW MATERIALS AND COMPONENTS

1. ICs
2. Transistors and diodes
3. Capacitors
4. Resistances
5. Calibrated temperature scale or LED's
6. Zenors
7. Thermocouples
8. PCBs
9. Transformers
10. Bridge Rectifiers
11. Regulators
12. Potentiometers
13. Multiturn pots
14. Dial indicators
15. Main Leads, fuses, switches etc.
16. Mechanical chasis.

..../3.

SOURCES OF SUPPLY (except standard temperature source)

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 40 KVA
Electricity consumption/month	: 4400 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing Manager	: 1
Purchase Manager	: 1
Marketing & Purchase Assistants	: 4
Testing & Inspection staff	: 4
Skilled Workers	: 10
Semi-skilled Workers	: 3
Unskilled Workers	: 2
Administration & Accounts	: 4
	30

REQUIRED AREA FOR PLANT SITE

Building	: 500 sq.meters
Land	: 1000 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of temperature controllers. They can be assembled in any moderately clean surroundings. The factory should preferably be situated in urban area, close to air-conditioner and/or process control instrument manufacturers.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, temperature indicators can also be produced utilising almost the same production facilities and marketing network.

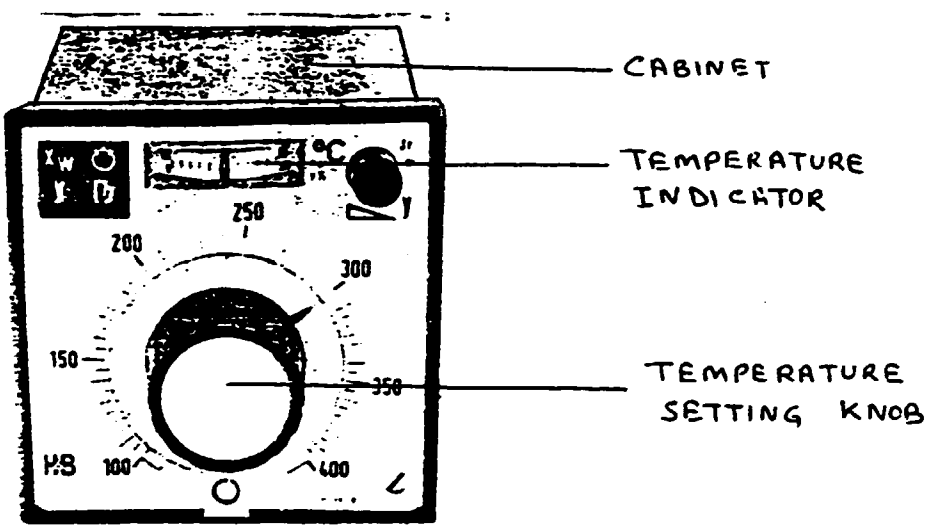
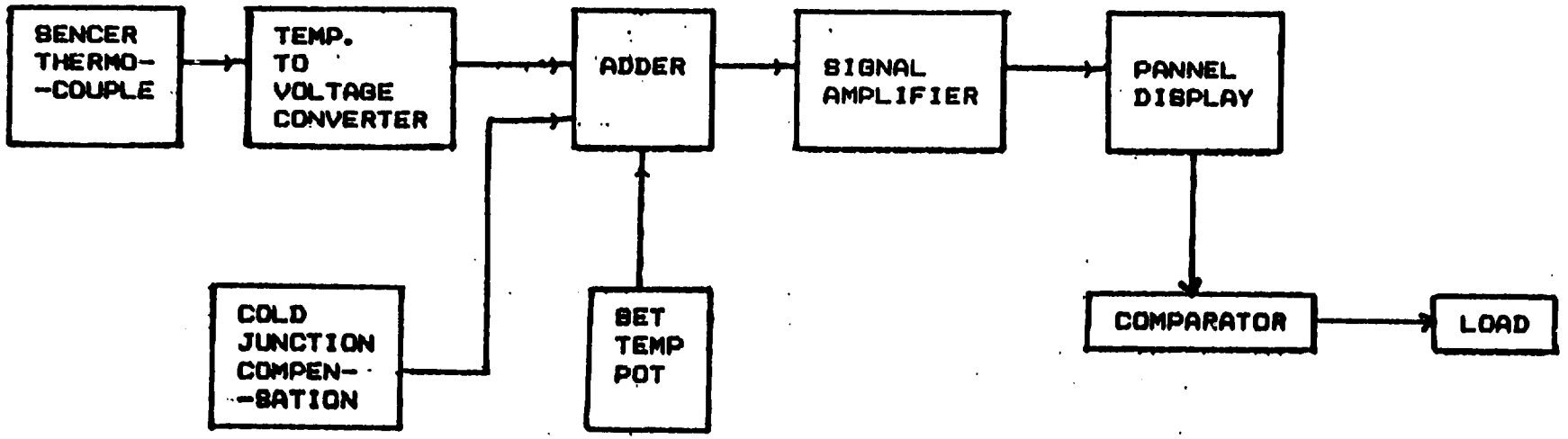

CABINET
TEMPERATURE INDICATOR
TEMPERATURE SETTING KNOB
°C
250
200
300
150
350
100
400

FIG.1



BLOCK - DIAGRAM

TEMP. CONTROLLER INDICATOR.

FIG. 2

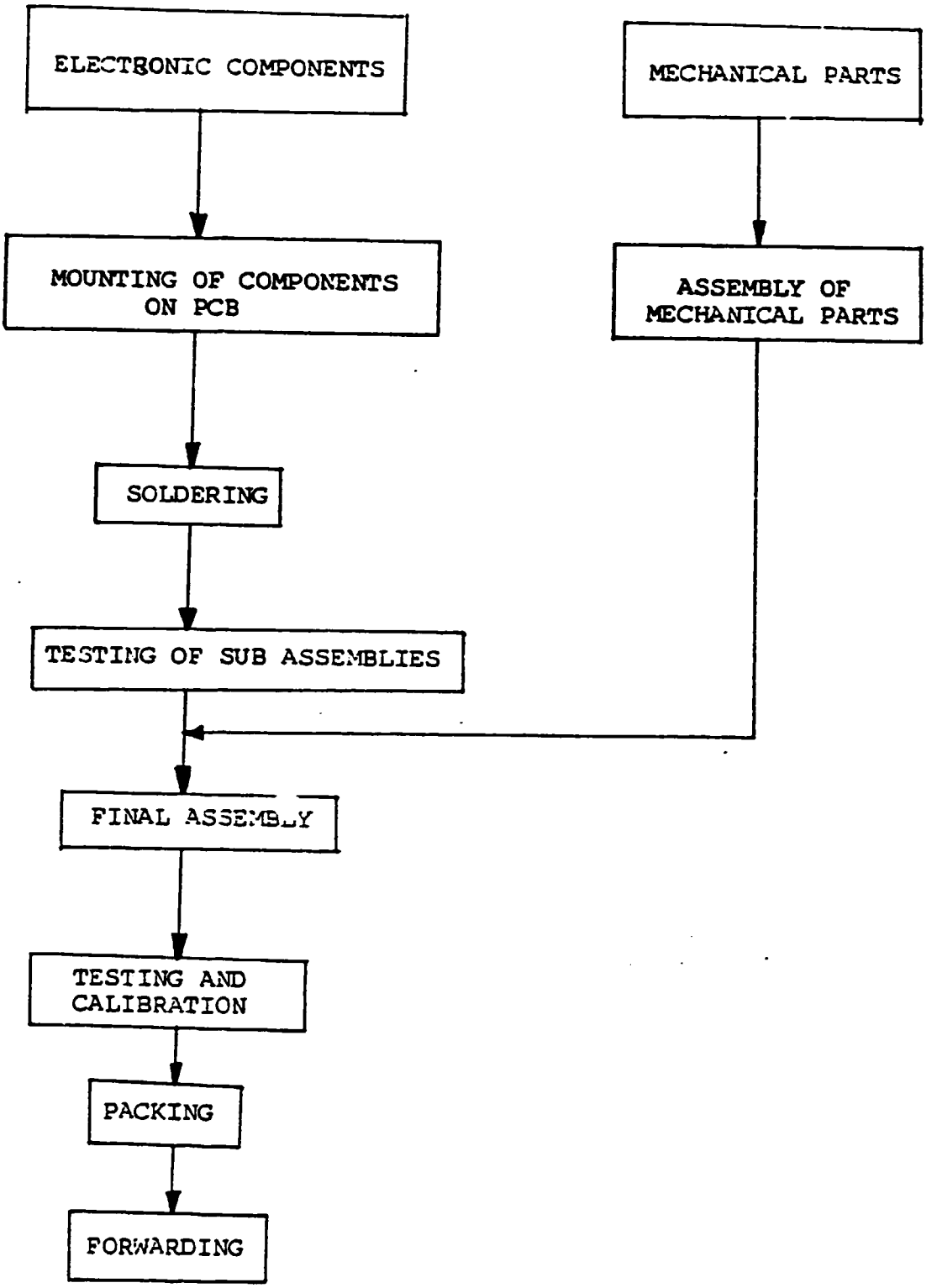

ELECTRONIC COMPONENTS
MECHANICAL PARTS
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF MECHANICAL PARTS
SOLDERING
TESTING OF SUB ASSEMBLIES
FINAL ASSEMBLY
TESTING AND CALIBRATION
PACKING
FORWARDING

FIG. 3

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate
Thane - 400 604,
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi - 110 119.

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Annie Besant Road,
Shiv Sagar Estate
Bombay.

4. Batliboi & Co. Limited
Jeevan Vihar Building
Sansad Marg,
New Delhi - 110 001

5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi - 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road, Chakala,
Andheri (East)
Bombay - 400 093.

OTHER COUNTRIES

7. Phillips Intl Bv,
Scientific & Indl.Equipment Div.
Dept. G,
TQ111-4 Eindenhoven
Neitherlands.

8. M/s Hewlett Packard Co.
5 Computer Drive South
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D-7257 - DITZINGEN - 1
FRG.

12. O.K.Industries INC.
3455, Corner Street,
New York - 10475,
USA.

13. Grant Instruments Cambridge Limited
Barrington
Cambridge
CB 25 QZ
UK.

INTERCOMMUNICATION EQUIPMENT PRODUCTION PLANT PROFILE

INTRODUCTION

With the advent of technology, office automation has grown at a very fast pace. Office of today is aiming at maximising the efficiency at low operational cost. For that, a proper flow of precise information at high speed is necessary to make quick decisions. Intercommunication equipment is one such device, meeting these requirements in offices, industry, commercial establishments etc.

Just by pressing a button on an intercommunication equipment, one can consult one's managers, direct his office, get all the desired information, even hold a conference and all this without moving from one's table. That is why, the intercommunication equipment has become an absolute necessity in modern offices.

A photograph and a block diagram of a typical intercommunication equipment are shown in Fig.1 & 2 respectively.

SPECIFICATIONS (TYPICAL)

No. of lines	: 5 to 40
Ring Supply	: 110V AC
Lamp Supply	: 10V AC

Special Features

- Conference and transfer
- Call forwarding
- Consultation hold
- Group call pick-up
- Paging facility

MARKET

The manufacture of intercommunication equipment is lucurative business in view of its demand in all the modern

day offices and commercial establishments. The application of intercommunication equipment is immense and its demand is ever increasing. Some of the areas of application are;

- Offices
- Defence establishments
- Large buildings
- Theatres and cinemas
- Conference halls
- Marshalling yards
- Hotels, etc.

ASSEMBLY PROCESS

Electronic components such as resistors, capacitors, diodes, transistors and ICs etc. are mounted and assembled on a printed circuit board which acts as an audio amplifier. The amplifier is tested for various electrical characteristics such as amplification, distortion and frequency response. It is then finally assembled before packing and forwarding.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 3,000 lines. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscope (15 MHz)
2. Multimeters (3½ digit)
3. Power supplies (0-30V, 2A)
4. Distortion analyser
5. Output power meter
6. Voltage Stabiliser
7. Assembly tools including soldering irons, pliers, cutters, etc.
8. Drilling machine

FOB(India)price of machinery & equipment: US$ 30,000(approx

REQUIRED RAW MATERIALS AND COMPONENTS

1. Active components namely ICs, transistors, diodes.
2. Passive components namely resistors, capacitors
3. LEDs
4. Moulded parts, casing etc.

..../3.

5. Transmitter & receiver modules
6. Ringers
7. Dialers
8. Push button switches
9. Hardware, wires, cables, leads, etc.

SOURCES OF SUPPLY

All equipment, raw materials and compohents are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 30 KVA
Electricity consumption/month	: 3300 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing Manager	: 1
Purchase Manager	: 1
Marketing/Purchase Assistants	: 2
Testing and Inspection Staff	: 2
Skilled Workers	: 5
Semi-skilled Workers	: 3
Unskilled Workers	: 2
Administration & Accounts	: 4
	22

REQUIRED AREA FOR PLANT SITE

Building	: 400 sq.meters
Land	: 800 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of intercommunication equipment. They can be assembled in any moderately clean surroundings. Building should preferably be

..../4.

of RCC structure to minimise dust. Further, factory should be situated close to a big city where the item is likely to have greater demand.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, assembly of telephone instruments can also be takenup utilising almost the same production facilities and marketing network.

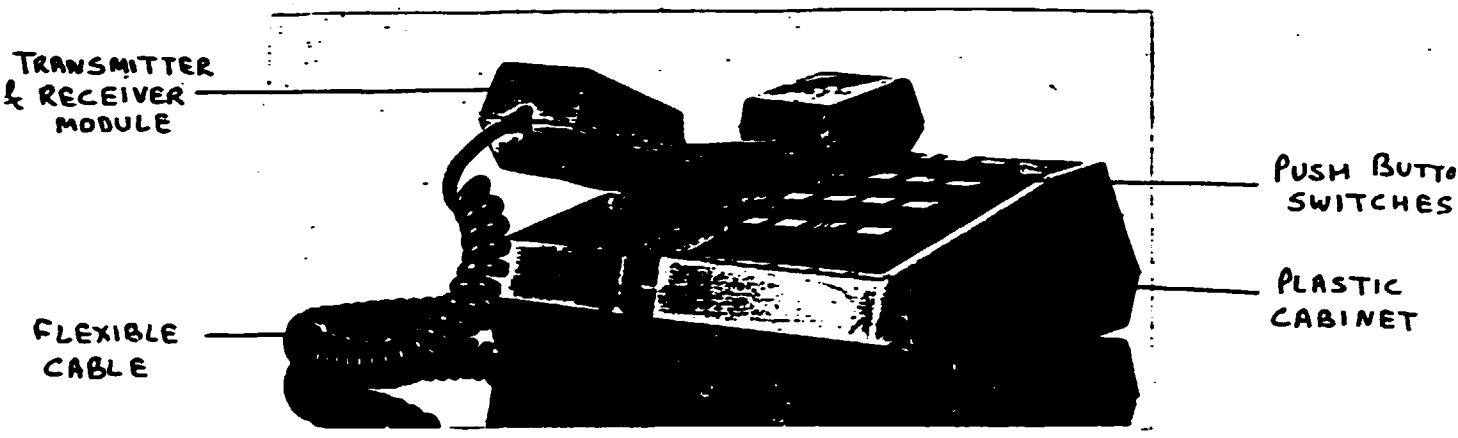

TRANSMITTER & RECEIVER MODULE
PUSH BUTTON SWITCHES
PLASTIC CABINET
FLEXIBLE CABLE

FIG.1

BLOCK DIAGRAM

THE BLOCK DIAGRAM OF AN INTERCOM SET SYSTEM IS GIVEN BELOW:

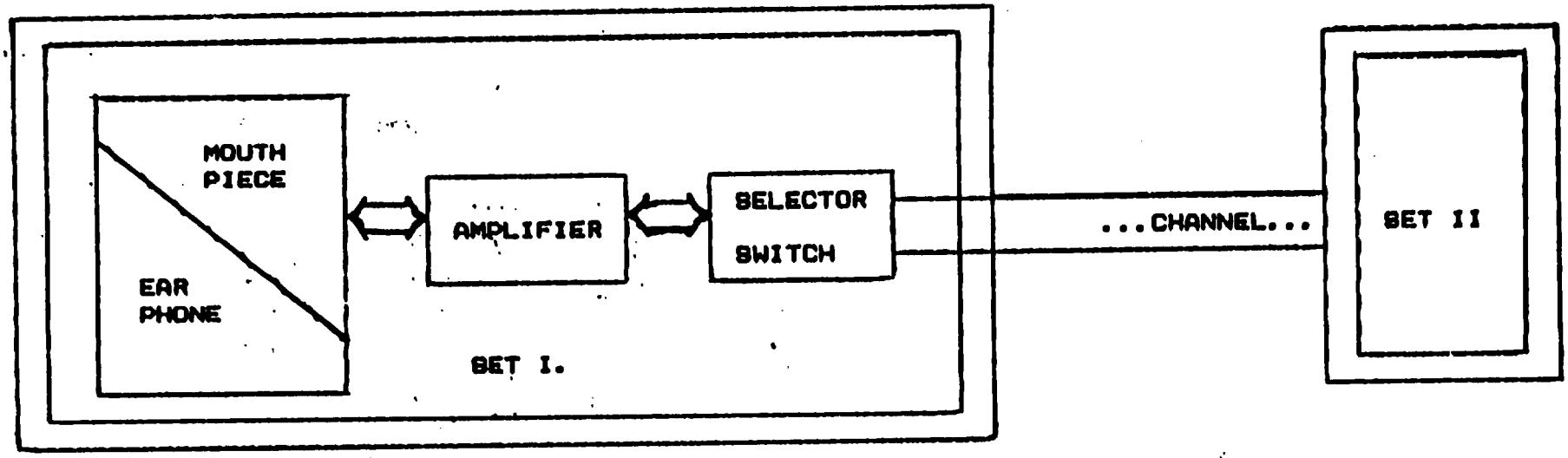
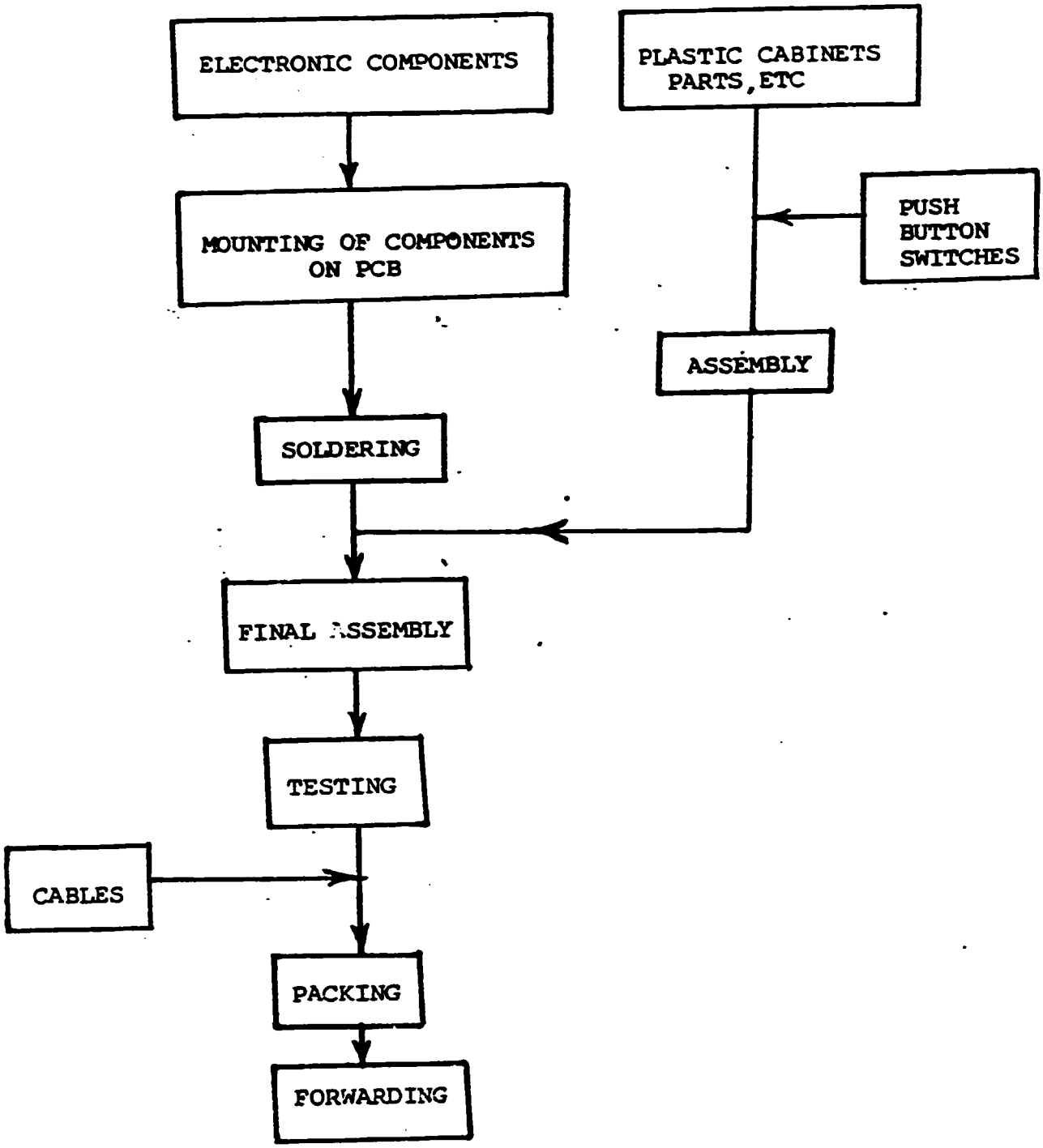


FIG.2


ELECTRONIC COMPONENTS
PLASTIC CABINETS PARTS, ETC
PUSH BUTTON SWITCHES
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY
SOLDERING
FINAL ASSEMBLY
TESTING
CABLES
PACKING
FORWARDING

FIG, 3

Annexure

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USA

9. Tektronix Inc.
Dept. G.,
P.O.Box 500
Y3-314 Beaverton Oregon-97077,
USA.

..2/.

10. Gould Instrument Limited,
Design & Test System Division
Deptt.G.Rocbuck Road,
Hainault Essex 1G63UE
UK

11. M/s TRUMPF GMBH
STUTTGART
D-7257 - DITZINGEN - 1
FRG

12. O.K.Industries INC.
3455,Corner Street
New York - 10475,
USA.

COMPUTER SOFTWARE PRODUCTION PLANT PROFILE

INTRODUCTION

The moment we talk of computers, it automatically refers to two very distinct aspects namely; computer hardware and computer software. Computer hardware is the physical machine. To make the computer run, certain instructions and programmes have to be fed into it. These instructions and programmes are called computer software.

The software itself further can be split into two components;

1. System software
2. Application software

The system software implies the development and production of compilers; interpretors; operating systems or programme utilities for the computer operation. Such software generally takes many manyears of developmental efforts. Hence, these are very expensive. On the other hand, application software aims at generating standardised programmes to be utilised at the user end. This software is in the area of billing, financial accounting, management information system, project monitoring etc.

Software costs have been increasing continuously over the years. On the other hand, the cost of computing has been going down at the rate of 20% per annum over the last two decades, mainly because the hardware costs have dropped by a factor of 1000 since 1955. The ratio of software costs to hardware costs is today 1.5 to 1, and is threatening to reach 3 to 1 in near future.

The reasons for this steady increase in software cost are three fold. First, there is a greater demand for software for performing the normal tasks in a better way, as well as for performing more number of tasks. Second, software maintenance costs are extremely high. And thirdly, costs have been increasing due to general inflation and non-availability of manpower.

..../2.

MARKET

The advancement in the computer technology during the last 2 decades has been phenominal. As a result, computers have become;

- Smaller in size
- Bigger in storage capacity
- Faster
- Highly reliable

The cost/performance ratio of 5 major categories of computers introduced by IBM, the world leader in computers during last two decades or so is given in Annexure-I. The same validates the trend listed above.

But the software has not been able to keep pace with the advancements in the hardware field. It is often stated that only 35% of the computer potentialities are being utilised worldover due to the software limitations. Thus, a computer is as versatile as its software.

According to one of the study reports pertaining to US markets, it has been predicted that market for microcomputer software alone which was about US$ 2 billion in 1985, will go up to US$ 25 billion by 1990. Efforts are also on to standardise software programmes which can run on any type of hardware. A fair amount of software standardisation has already been achieved in the range of personnal computers and the same are available off the shelf.

In India also, the computers are passing through a boom period. It is the only industry having an annual growth rate of more than 60%. Similar is going to be the scenerio in other developing countries.

SOFTWARE ACTIVITIES

Software activities can be grouped as;

- Software development
- Software execution/production
- Software quality assurance
- Software refinements/enhancements
- Software maintenance
- Support software

Software development includes design cycle till the release of the software for 'production'. The activities required to 'run' the software or to make it 'runnable' for a given application are grouped under software execution/ production. Quality assurance activities refer to exhaustive

..../3.

testing done by groups other than developers to 'evaluate' the software.

Software Development Cycle

The various activities that can be listed under this cycle and the relative degrees of complexity in these are as under;

1. System studies
2. Specification generation
3. System design
4. High level design
5. Module implementation
6. Coding, loading, assembly (compilation)
7. Test plan preparation
8. Test data preparation
9. Testing (module level)
10. Integration and test (system level)
11. Field introduction and support
12. Documentation;
    - design
    - user
    - maintenance

Software Execution/Production

The activities in this classification pertains to efforts required either in making the developed systems 'runnable' or running the software on a day-to-day basis.

Software Quality Assurance

As depicted in Fig.1, quality assurance activities account for 13% of the costs of a typical software development cycles. Users and developers have now realised that software problems are tricky and the longer they stay latent, the more disastrous are their effects and the more costly is the fix. In fact, a 'bug' caught in the field can cost more than thirty times the one found at the coding testing phase.

The economics of fixing 'bugs' during the development cycle has given birth to a new service-oriented industry in the software field called software evaluation and quality assurance.

Software Refinements/Enhancements

Refinements (performing the same tasks more efficiently or more flexibly) and enhancements (performing other tasks) require changes in existing software packages. [illegible] additions

..../4.

or alterations in a 'working' package is dangerous because the implications of such changes are not always obvious. Exhaustive testing subsequent to the changes is the only way to ensure reliability but is often not carried out because of high costs and shortage of manpower. However, such compromises hurt in the long run.

Software Maintenance

Since the activity requires constant interaction with the ultimate user, and since updates affect production on a day-to-day basis, the software maintenance market is not tappable by working from a developing country.

Support Software

The required skills and complexity levels for the support software has all the levels of any other software. In large software projects, where support software is concurrently developed, it is common experience that support software demands equal resources costing about 50% of the total development cost. What makes this class of software distinct is that unlike other 'custom' software products, these products can have a much wider market. There are success stories of groups of entrepreneurs developing goods support software for some popular machines. As time progresses and as developing countries reach a level of competence, support software will be a new area for exports due to its 'mass' market potential.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual business of software development and data processing is expected to be of the order of US$ 500,000. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. A computer system with the following configurations;

Item	Specifications	Quantity
1) CPU with floating point-co-processor	16/32 bits	One
2) Main Memory	1024 KB	One
3) Floppy disk drive	5¼" DSDD	One
4) Hard disk drive	80 MB	Two
5) Magnetic tape drive (Streamer)	9 tracks 800/1600 bpi 2400' spool	One
6) Line Printer	600 Lpm	One

..../5.

7) Online VDU's	Standard detachable keyboard	Four
8) Offline data entry machines	Full screen detachable keyboard	Four

2. Uninterrupted power supply (5 KVA)
3. Diesel Generator as stand-by power supply (60 KVA)
4. Voltage Stabilizers
5. Isolation Transformers
6. Miscellaneous equipment like vacuum cleaner, de-humidifier, etc.

FOB(India) price of machinery & equipment: US$ 100,000(approx)

REQUIRED RAW MATERIALS AND COMPONENTS

1. Computer media including floppies, magnetic tapes, disk packs.
2. Printer ribbons
3. Computer stationery
4. System software packages.

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure-II.

REQUIRED UTILITIES

Electric Power	: 75 KVA
Power consumption/month	: 8300 KWH

REQUIRED MANPOWER

Software Development Manager	: 1
Marketing/Purchase Manager	: 1
Marketing/Purchase Assistant	: 1
Sr.System Analyst	: 2
SystemAnalyst	: 4
Programmers	: 8
Jr Programmers	: 4
Data Entry Operators	: 5
Administration/Accounts	: 4
	30

..../6.

REQUIRED AREA FOR PLANT SITE

Building	: 400 sq.meters
Land	: 800 sq.meters

LOCATIONAL CONDITIONS

Building should be of RCC structure so as to make it dust free and almost wholly air-conditioned. The factory should be situated in urban areas and big cities for the following reasons;

1. Better housing, schooling and entertainment facilities for software engineers.
2. Better market because most of the industrial houses and offices requiring software and data processing are likely to be situated there.

ANNEXURE-I

COST PERFORMANCE DATA OF

FIVE GENERATIONS OF IBM MAINFRAME COMPUTERS

System Name	Year Introduced	Maximum Memory size (in megabytes)	Cost per MIP* (in $ x1000)	Price per Megabyte (in $x1000)
360	1964	1	3,500	1,600
370	1970	16	2,000	100
3030	1977	32	400	25
308X	1981	128	240	16
3090	1985	192	180	7

* MIP stands for Million instructions per second (Source: New York Times, February 13, 1985).

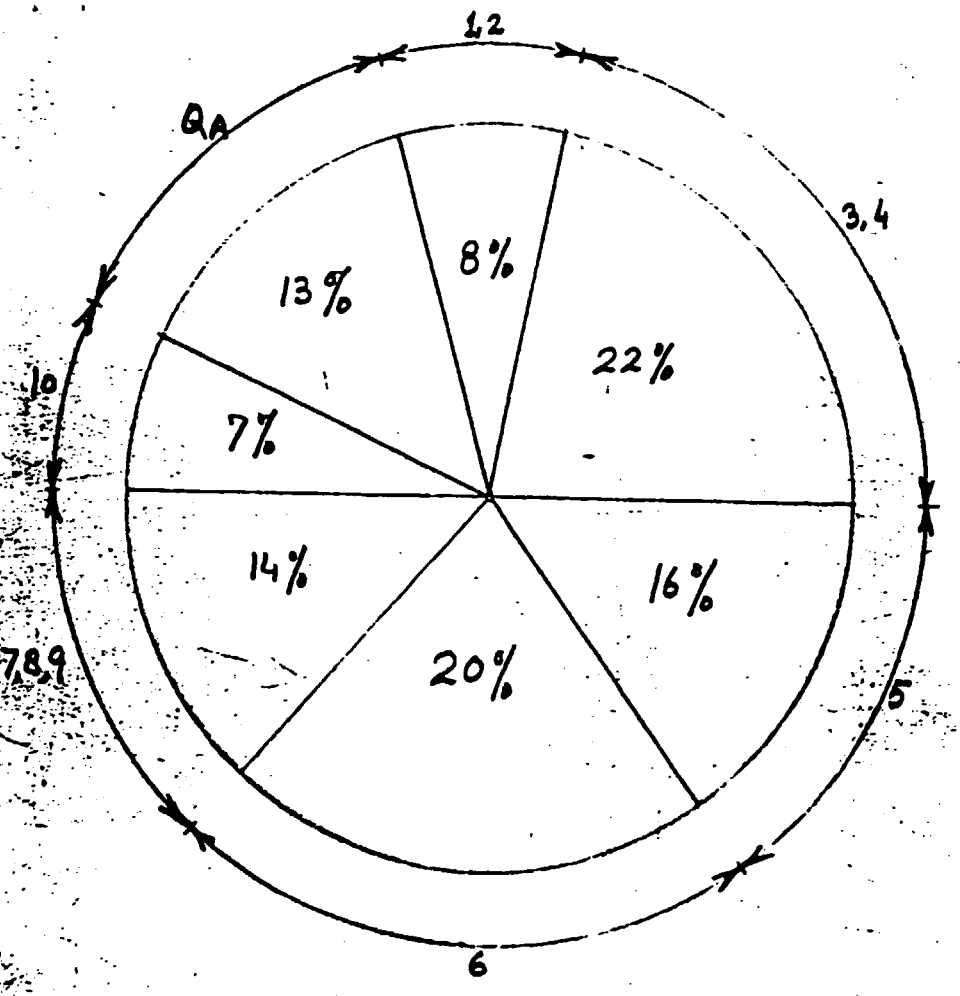


Fig.1: Distribution of costs in a typical development cycle. The peripheral numbers refer to the listed activities during the development cycle.

Annexure-II

INDIA

1. Electronics Systems Punjab Ltd.(ESPL)
B-81, Phase VII, Industrial Area
SAS Nagar,
Chandigarh-160 055.

2. Hindustan Computers Limited(HCL)
G-8, 9 & 10,
Noida Complex,
Distt.Ghaziabad(U.P).

3. DCM Data Products
2nd Floor
8-E, Rani Jhansi Road,
New Delhi-110 055.

4. The National Radio & Electronics Co.Limited
Mahakali Caves Road,Chakala,
Andheri (East)
Bombay-400 093.

5. Applied Electronics Limited
APLAB House
A-5 Wagle Indl.Estate
Thane-400 604
Maharashtra.

6. Wipro Information Technology Limited
55,Community Centre, Basant Lok
Vasant Vihar,
New Delhi-110 057.

7. Batliboi & Co.Limited
Jeevan Vihar Building
Sansad Marg,
New Delhi-110 001.

OTHER COUNTRIES

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
New York-12205
USA

9. Digital Equipment Corporation,
77 Reed Road,
HL02-1/E10,
Hudson,
MA01749,
USA.

..2/.

10. Texas Instruments Incorporated,
P.O. Box 402430,
Dept.DNA2Ø3EC,
Dallas,
Texas 75240

11. International Business Machines (IBM)
Armonk, N.Y.
USA

GRAIN MOISTURE METER PRODUCTION PLANT PROFILE

INTRODUCTION

in moisture meter is a device for the measurement of moisture content in different kinds of grains like wheat, paddy, maize etc. The measurement of moisture is based on the principle of change in capacitance with moisture content.

The sample to be tested is poured slowly into the sensor container. As soon as the pre-determined weight of grain has been poured into the container, contact is made and percentage of moisture conent is displayed.

A photograph and block diagram of a typical grain moisture meter are shown in Fig. 1 and 2 respectively.

SPECIFICATIONS (TYPICAL)

Principle of Operation	: Capacitance variation
Operating Temperature	: 0°C to 50°C
Optimum Working Temperature	: 15°C to 45°C
Range	: 5% to 25%
Accuracy	: ± 0.5% ± 1 digit
Display	: 3 Digit LED

MARKET

In addition to the use of grain moisture meter in laboratories, it finds wide applications in grain storage and grain processing. With the increase of grain production in developing countries, the demand for grain moisture meter is going to grow steadily.

ASSEMBLY PROCESS

It is proposed to purchase all the components from outside and assemble them together. The assembly of grain moisture meter involves mounting and soldering of electronic components on PCB, assembly of sheet metal housing including

..../2.

LED display device, switches/push buttons, etc., After final assembly, the grain moisture meter is tested and calibrated for various types of grains.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity is proposed to be 2,000 nos. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscopes (10 MHz)
2. Multimeters (3½ digit)
3. Capacitance meters
4. Power supplies (0-30V,2A)
5. Soldering irons
6. Drilling machine
7. Hand tools etc.
8. Voltage Stabiliser(1.1 KVA)

FOB(India) price of machinery and equipment:US$ 30,000 (approx.)

REQUIRED RAW MATERIALS AND COMPONENTS

1. ICs
2. Microprocessors
3. Transistors
4. Diodes
5. Resistors
6. LEDs
7. Capacitors
8. PCBs
9. Transformers
10. Sensors
11. Cabinets
12. Switches, push buttons, wires,leads, etc.

SOURCES OF SUPPLY

All the equipment, raw materials and components are available in India. However, these could also be purchased from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

..../3.

REQUIRED UTILITIES

Electricity	: 25 KVA
Power consumption/month	: 2800 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing/Purchase Manager	: 1
Marketing/Purchase Assistants	: 2
Testing & Inspection Staff	: 2
Skilled Workers	: 5
Semi-skilled Workers	: 3
Unskilled Workers	: 2
Administration & Accounts	: 4
	20

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of grain moisture meters. These can be assembled in any moderately clean surroundings. Building should preferably be of RCC structure to minimise dust.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, other agri-electronic equipment like soil moisture meters, soil test kits, grain analysers, etc. can also be produced utilising almost the same production facilities and marketing network.

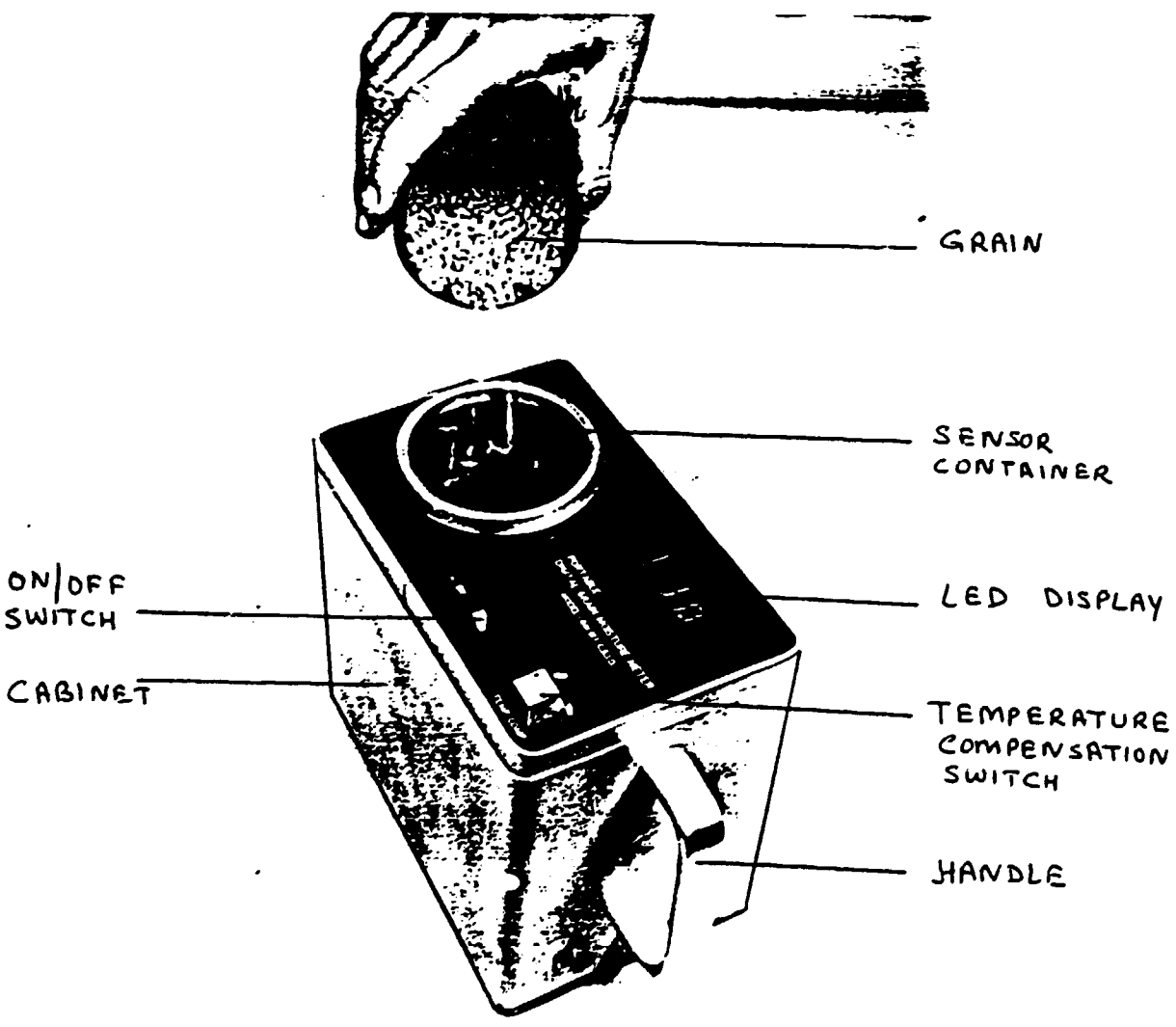

GRAIN
SENSOR CONTAINER
ON/OFF SWITCH
LED DISPLAY
CABINET
TEMPERATURE COMPENSATION SWITCH
HANDLE

FIG.1

GRAIN MOISTURE METER

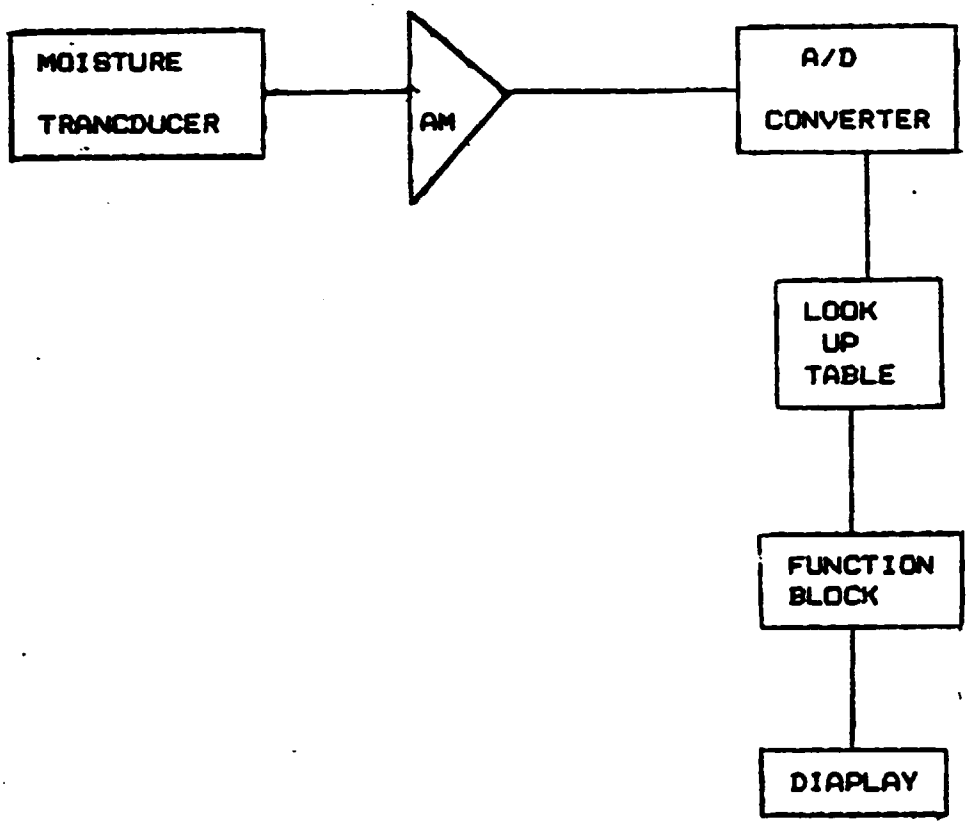


FIG. 2

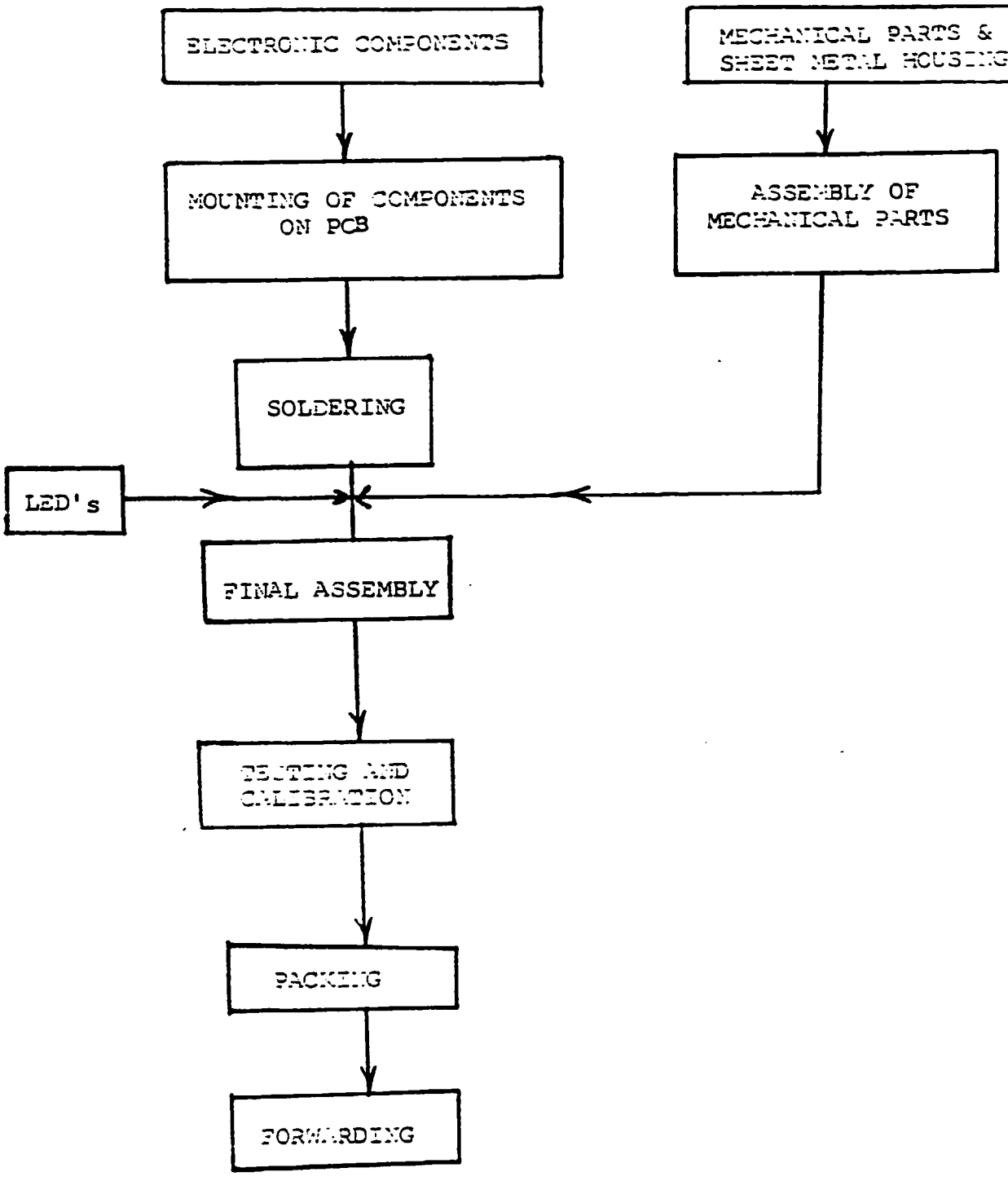

ELECTRONIC COMPONENTS
MECHANICAL PARTS &
SHEET METAL HOUSING
MOUNTING OF COMPONENTS
ON PCB
ASSEMBLY OF
MECHANICAL PARTS
SOLDERING
LED's
FINAL ASSEMBLY
TESTING AND
CALIBRATION
PACKING
FORWARDING

FIG.3

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate
Thane - 400 604,
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi - 110 019.

3. Phillips India Limited
Annie Besant Road,
Shiv Sagar Estate
Bombay.

4. Batliboi & Co.Limited
Jeevan Vihar Building
Sansad Marg,
New Delhi - 110 001.

5. HMT Limited
Jeevan Tara Building
Sansad Marg,
New Delhi - 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road, Chakala,
Andheri (East)
Bombay - 400 093.

OTHER COUNTRIES

7. Phillips Intl Bv,
Scientific & Indl.Equipment Div.
Dept. G,
TQ111-4 Eindenhoven
Neitherlands.

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
New York-12205
USA.

9. Tektronix Inc.
Dept. G,
P.O.Box 500,
Y3-314 Beaverton Oregon-97077,
USA.

..2/.

RADIO AND TV COILS PRODUCTION PLANT PROFILE

INTRODUCTION

Coils are used in resonant circuits for tuning of radios and TVs. Coils are also used in deflection circuits of TV receivers for linearity control. They also find other applications like resonant circuits, filters etc. for in communication equipment. Coils are of two types namely fixed and variable.

Since these items are small in size and low in cost, their production is well suited to small scale sector.

A photograph of typical radio and TV coils is shown in Fig.1.

SPECIFICATIONS (TYPICAL)

1. MW OSC coils
   SW OSC coils
   SW Aerial coils
   10mm & 7mm
2. AM/FM IFTs 10mm & 7mm
   TV-Video IFTs
   TV-Sound IFTs
   300 Kc/s-50Mc/s
   0.2uH-2mH
3. Variable Inductors
   0.5 uH-40mH

MARKET

With the increase in radio and TV network, particularly in developing countries, the demand for radios and T.Vs is growing steadily thereby improving the market for these components. It is suggested that the unit may have a tie-up with few TV and radio manufacturers to supply the products as ancillary items.

..../2.

ASSEMBLY PROCESS

Coils can be wound either with or without using a magnetic core. They are called magnetic core coils and air-core coils respectively. Air coils can be either self-supporting where turns are wound without any support/former or those wound on a plastic former. The process involves winding of copper wire using a coil-winding machine. After winding, the ends are taken out and tinned after removing the insulating enamel. A good coil winding machine ensures uniform winding and pressure to produce coils of consistant quality.

In case of coils and allied items using ferrite as a core, the coil is wound on a bobbin which has a plastic base. This base is a moulded piece and has connecting pins on which the coil ends are soldered. The ferrite cores are then fixed on the base and a metal can is placed for shielding the winding wherever necessary. Only the connecting pins project outside the can.

The general practice adopted for assembly of coils and allied items is to get most of the parts like moulded bases, bobbins, cans, ferrite cores, copper wire, etc. from other parties who produce these in large quantities and supply them at cheaper rates. Only the coil winding, assembly and testing is done in-house.

In a number of cases, impregnation and bake-curing is done to protect the coils from weather effects. For this, an oven is required to be installed in house.

Very careful and strict testing is required to be done to produce coils of acceptable quality. Basically continuity, insulation, inductance and Q factor of the coils are measured.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day, and 300 days per year, annual capacity of the plant is proposed to be 5,00,000 nos. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Coil Winding machines
2. Signal Generators
3. Q meters
4. LCR Bridges
5. Impregnation tank
6. Oven
7. Drilling machine
8. Soldering irons
9. Multimeters
10. Hand tools like nose pliers, tweezers and cutters etc.

..../3.

FOB(India) price of machinery & equipment: US$ 60,000 (approx.)

REQUIRED RAW MATERIAL AND COMPONENTS

1. Super enamelled copper wire
2. Formers
3. Casing and clamps
4. Cores (Ferrite)
5. Metal cans
6. Plastic base
7. Insulation material
8. Hardware items

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 50 KVA
Electricity consumption/month	: 5500 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing & Purchase Manager	: 1
Marketing & Purchase Assistants	: 2
Testing and Inspection Staff	: 3
Skilled Workers	: 5
Semi-skilled Workers	: 2
Administration & Accounts	: 2
	16

REQUIRED AREA FOR PLANT SITE

Building	: 500 sq.meters
Land	: 1000 sq.meters

..../4.

PROCESS FLOW SHEET

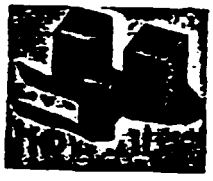
Process Flow is shown in Fig.2.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of radio and TV coils. They can be assembled in any moderately clean surroundings. The building should be of RCC structure to minimise dust. Further, the factory should preferably be situated close to TV and radio manufacturing units.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, other related items like transformers, chokes, etc. can also be produced utilising almost the same production facilities and marketing network.



MW, SW COILS

AM/FM IFTs

VARIABLE
INDUCTORS

FIG. 1

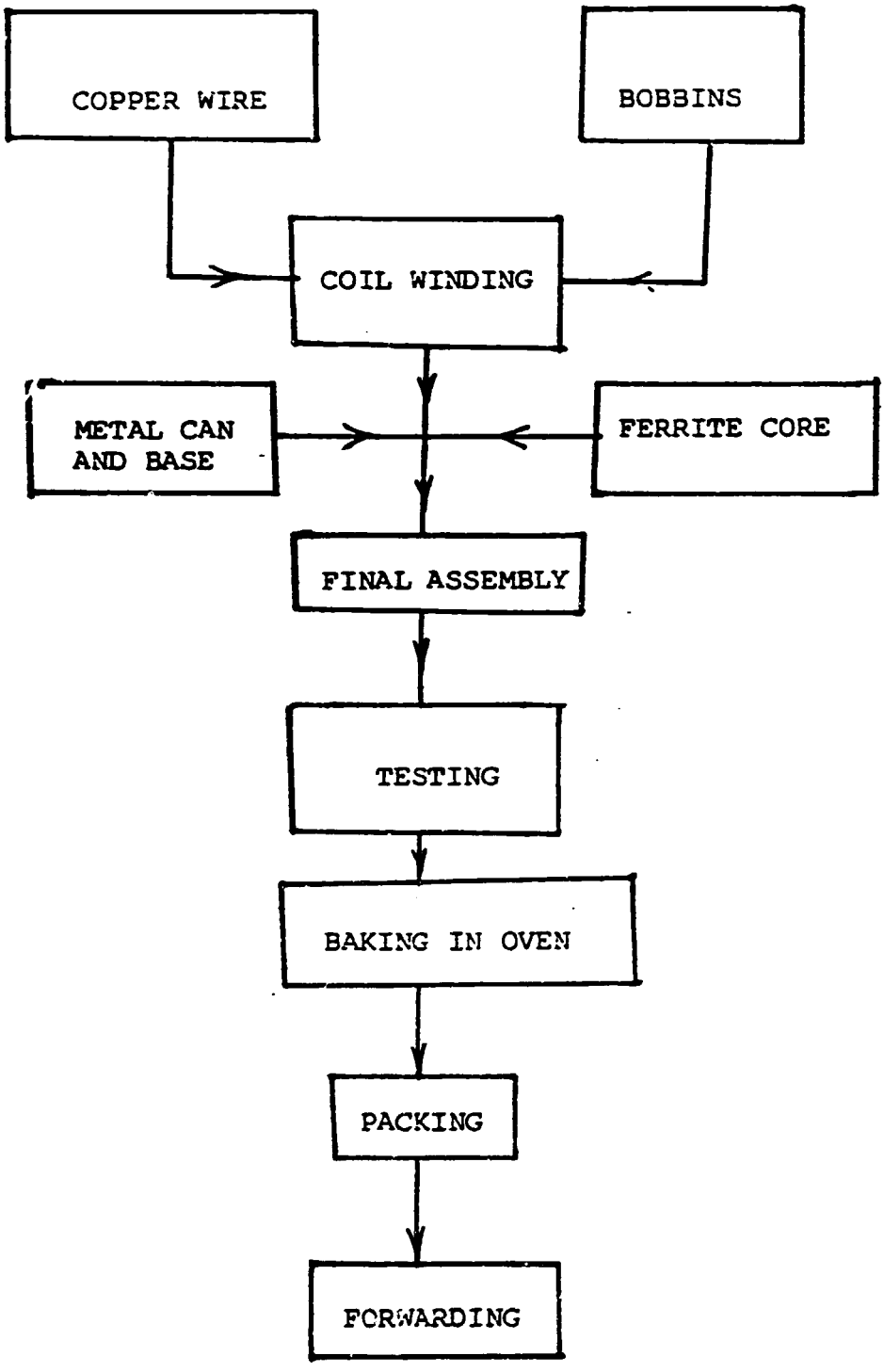

COPPER WIRE
BOBBINS
COIL WINDING
METAL CAN AND BASE
FERRITE CORE
FINAL ASSEMBLY
TESTING
BAKING IN OVEN
PACKING
FORWARDING

FIG.2

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate,
Thane - 400 604,
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
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Bombay.

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5. HMT Limited,
Jeevan Tara Building
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Mahakali Caves Road, Chakala,
Andheri (East)
Bombay - 400 093.

OTHER COUNTRIES

7. Phillips Intl Bv,
Scientific & Indl.Equipment Div.
Dept. G,
TQ111-4 Eindenhoven
Neitherlands.

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
New York-12205,
USA

9. M/s TRUMPF GMBH
STUTTGART
D-7257 - DITZINGEN - 1
FRG.

10. O.K.Industries INC.
3455,Corner Street
New York - 10475,
USA

TEACHING AIDS PRODUCTION PLANT PROFILE

INTRODUCTION

The electronic teaching aids are demonstration boards which enable the students to learn or perform experiments in illustrative ways. Electronic Teaching Aids are used in schools, colleges, industrial training institutes, polytechnics, etc. for teaching electronics. These aids are in the form of training kits for learning the working and applications of various electronic components like diodes, transistors, ICs etc.

Block diagrams of 3 types of typical electronic teaching aids (as sample) are shown in Fig. 1,2 and 3.

SPECIFICATIONS (TYPICAL)

1. IC Trainer

   To construct and test the following experiments;

   1) A simple differential amplifier/gain amplifier
   2) Voltage comparator
   3) Variable voltage source
   4) Current to voltage converter and vice versa
   5) etc.

2. RC Trainer

   To construct and conduct the experiments regarding;

   1) Series and parallel laws of resistances
   2) Series and parallel laws of capacitances
   3) Ohm's law, circuit theorems, bridges CKT
   4) etc.

3. Semiconductor Trainer

   To construct and conduct experiments on diodes and transistors and to draw their following characteristics;

   1) Diodes : FB, RB
   2) Transistors : CC,CB,CE as a switch and as a amplifie
   3) etc.

..../2.

MARKET

The training kits find usage in educational institutions where electronics is one of the subjects. With the increase in electronics manufacturing activities, availability of trained manpower in the field of electronics is very essential. Thus, the market for the training kits is expected to be substantial in any developing country.

ASSEMBLY PROCESS

The various components such as resistors, capacitors, transistors, diodes, ICs etc. are mounted on epoxy sheet and are inter connected with wires as per circuit design. The direction of current flow and voltage direction at various points are marked and pointed. Voltmeters and ammeters are also connected at various points in the circuit to indicate voltage and current parameters. These circuits are then tested for frequency response, output currents and voltages, etc. depending upon the type of teaching kit.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 10,000 kits of teaching aids. Incidentally, this is the minimum economically viable capacity keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscope (10MHz)
2. Signal Generator (10 MHz)
3. Multimeters (3½ digit)
4. Power Supplies (0-30V,2A)
5. Voltage Stabiliser
6. Output Meters
7. V.T.V.M.
8. LCR Bridge
9. Printing and Marking set
10. Drilling machine
11. Soldering irons
12. Hand tools like screw driver set, nose pliers, cutters, tweezers etc.

FOB(India)price of machinery and equipment: US$ 25,000 (approx).

REQUIRED RAW MATERIALS AND COMPONENTS

1. Epoxy sheets
2. ICs
3. Transistors
4. Diodes

..../3.

5. Resistors
6. Capacitors
7. Potentiometers
8. Voltmeters
9. Ammeters
10. Loud-speakers
11. Coils
12. IC sockets
13. Connecting wires
14. Sockets

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 10 KVA
Electricity consumption/month	: 1100 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing & Purchase Manager	: 1
Marketing & Purchase Assistant	: 2
Testing and Inspection Staff	: 2
Skilled Workers	: 4
Semi-skilled Workers	: 2
Unskilled Workers	: 2
Administration & Accounts	: 4
	18

REQUIRED AREA FOR PLANT SITE

Building	: 200 sq.meters
Land	: 400 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.4.

..../4.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of teaching aids. These can be assembled in any moderately clean surroundings. The factory should preferably be situated in urban areas and close to academic institutions where the item is likely to have the main demand.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, electronic toys can also be produced utilising almost the same production facilities. However, an additional marketing network will have to be created for selling electronic toys.

TEACHING AID

DIGITAL & ANALOG I.C. TRAINER KIT

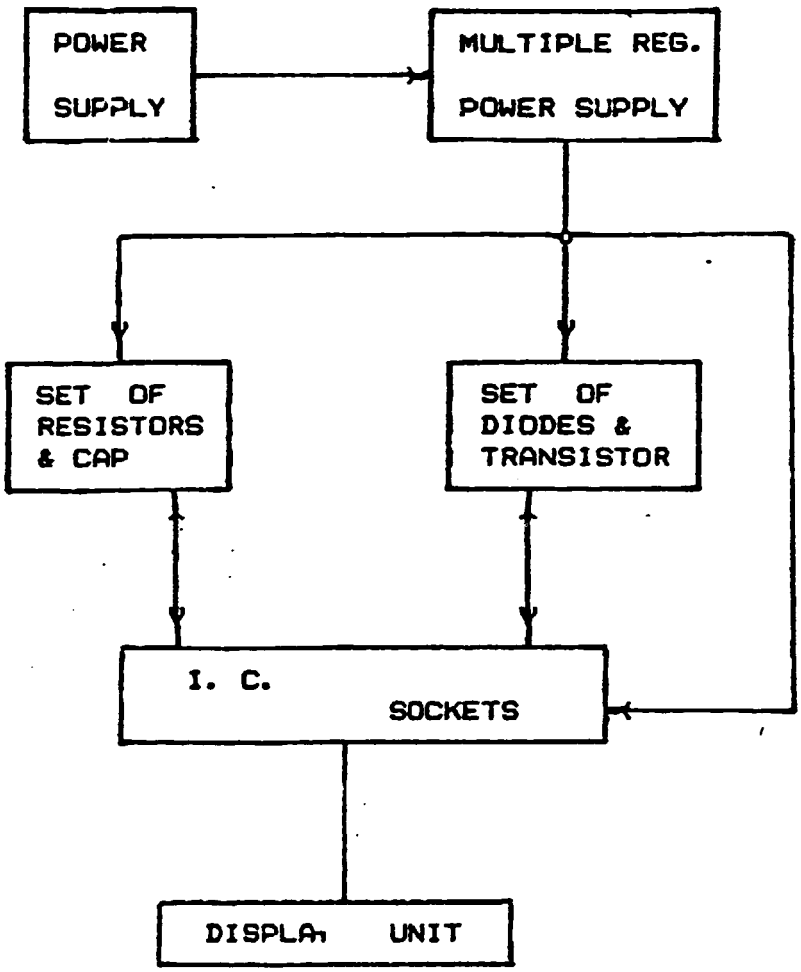

Fig.1

TEACHING AID

BLOCK DIAGRAM

COMBINATION OF RESISTANCE AND CAPACITANCE TRAINER KIT

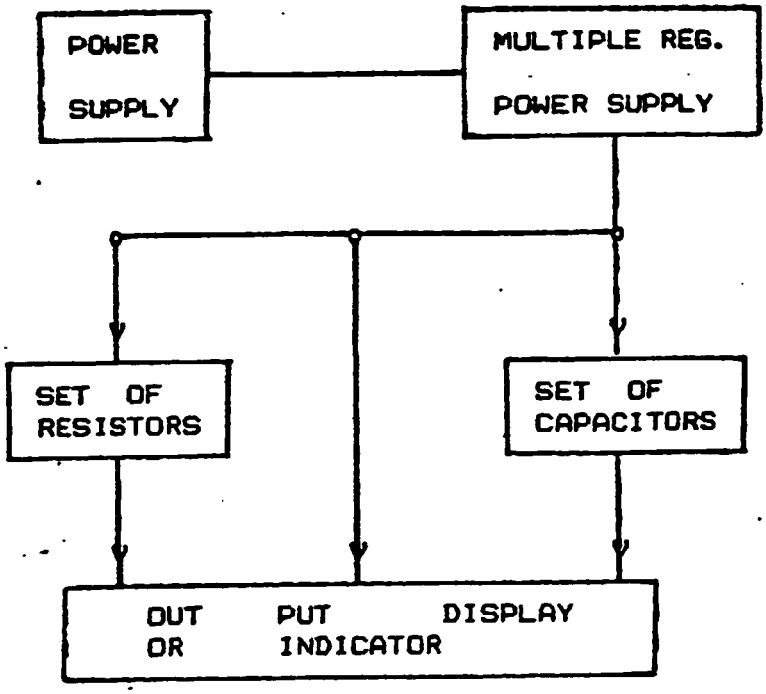

Fig.2

ANALOG SEMICONDUCTORS (DIODES & TRANSISTOR) TRAINER KIT

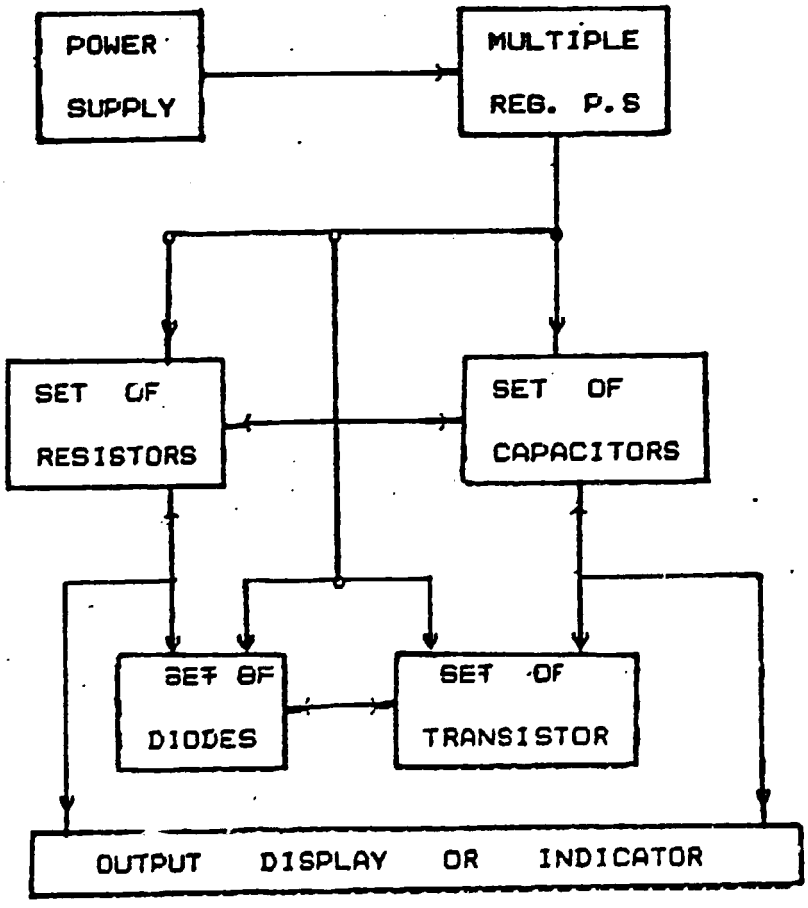

Fig.3

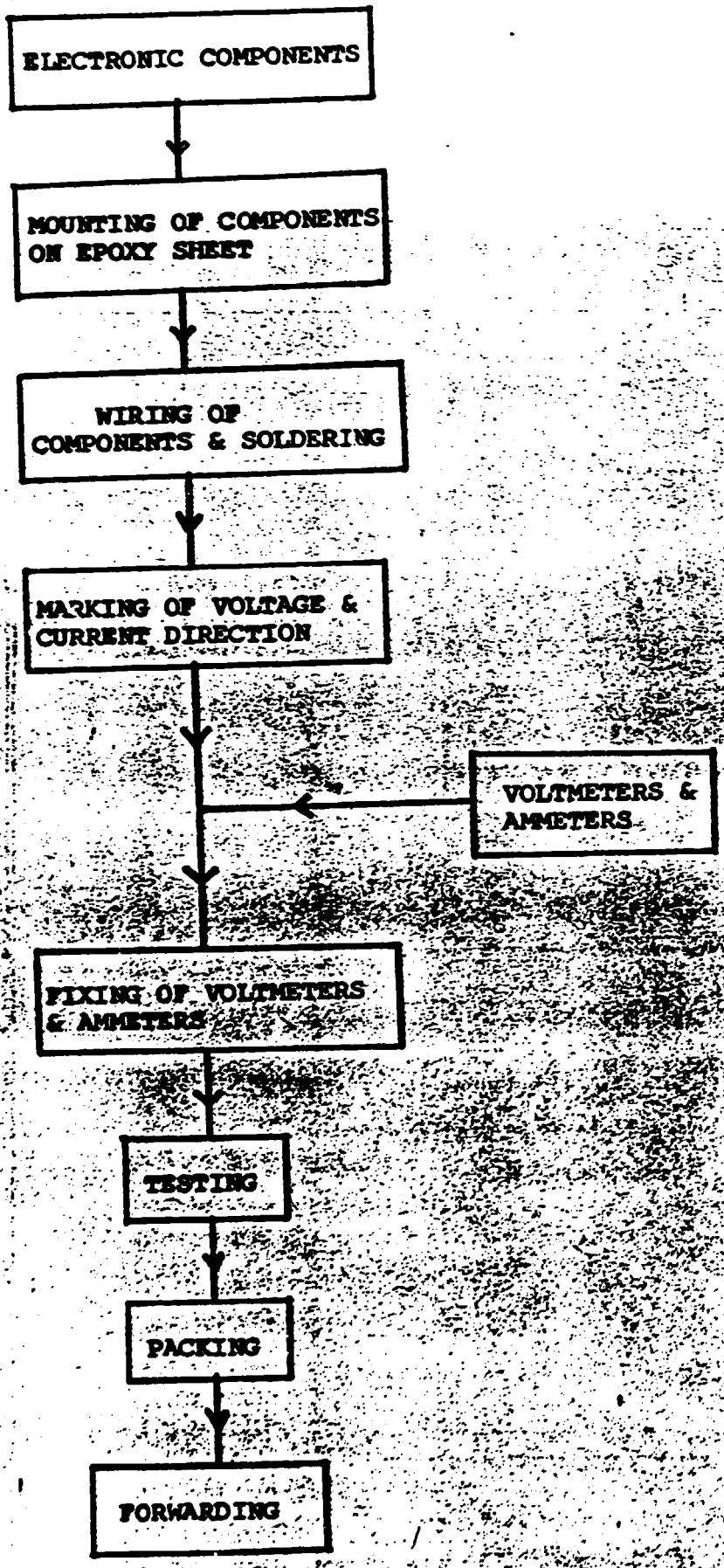
ELECTRONIC COMPONENTS
MOUNTING OF COMPONENTS ON EPOXY SHEET
WIRING OF COMPONENTS & SOLDERING
MARKING OF VOLTAGE & CURRENT DIRECTION
VOLTMETERS & AMMETERS
FIXING OF VOLTMETERS & AMMETERS
TESTING
PACKING
FORWARDING

Fig.4

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate
Thane - 400 604
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi - 110 019

3. Phillips India Limited
Annie Besant Road
Shiv Sagar Estate
Bombay

4. Batliboi & Co. Limited
Jeevan Vihar Building
Sansad Marg,
New Delhi - 110 001

5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi 110 001

6. The National Radio & Electronics Co. Limited
Mahakali Caves Road, Chakala,
Andheri (East)
Bombay - 400 093

OTHER COUNTRIES

7. Philips Intl Bv,
Scientific & Indl. Equipment Div.
Dept. G,
TQ 111-4 Eindenhoven
Neitherlands.

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
New York - 12205,
USA

9. Tektronix Inc,
Dept. G,
P.O. Box 500,
Y3-314 Beaverton Oregon - 97077
USA

.....2/-

10. Gould Instrument Limited,
Design & Test System Division
Dept. G. Rochuck Road,
Hainault Essex 1G63UE
UK

11. M/s TRUMPF GMBH
STUTTGART
D-7257 - DITZINGEN - 1
FRG.

12. O.K. Industries INC.
3455, Corner Street
New York - 10475,
U.S.A.

Annexure

1. Dusenbery Europe Ltd.,
Shuttleworth Road,
Bedford MK41 OHS
UK.

2. Finetape USA Inc.
931, No Citrus Ave
Hollywood,
California-90038
USA.

3. Philips Intl Bv,
Scientific & Indl Equipment Div.
Dept.G
TQ 111-4 Eindenhoven
Neitherlands.

4. Tektronix Inc,
Dept.G
P.O.Box 500
Y3-314 Beaverton Oregon 97077
USA

AUDIO CASSETTES/PRE-RECORDED CASSETTES PRODUCTION PLANT PROFILE

INTRODUCTION

The audio cassettes have invaded entertainment field and have found wide acceptance over the long play records because of lower cost, possibility of reuse and easy maintenance.

An audio cassette is nothing but a magnetic tape housed in a plastic shell. The basic principle of sound recording on a magnetic tape is to convert sound signals into electric impulses and then convert them back to audio forms. Thus, either the sound signals are stored permanently on the tape or can be erased at any time to accommodate a new signal or information. Both for recording as well as erasing, a tape recorder is essential.

A photograph of a typical audio cassette/pre-recorded cassette is shown in Fig.1.

SPECIFICATIONS (TYPICAL)

Frequency Response	: 4.5 dB at 10 KHz
Modulation Noise Level	: 5 dB
Bias Noise Level	: (-) 3.5 dB
Peak Level	: .3 dB
Dynamic Range	: 6 dB

MARKET

With the standard of living rising in developing countries, usage of tape recorder and recorded tape music is on the increase. Considering that the user of a tape recorder buys five recorded cassettes a year, the market for cassettes can easily be estimated. Keeping in view the availability of high quality audio tapes and their minimal maintenance and storage requirements, pre-recorded cassettes are giving a tough time to the manufacturers of long playing records. Thus, the demand for audio cassettes is going to grow in coming years in developing countries.

..../2.

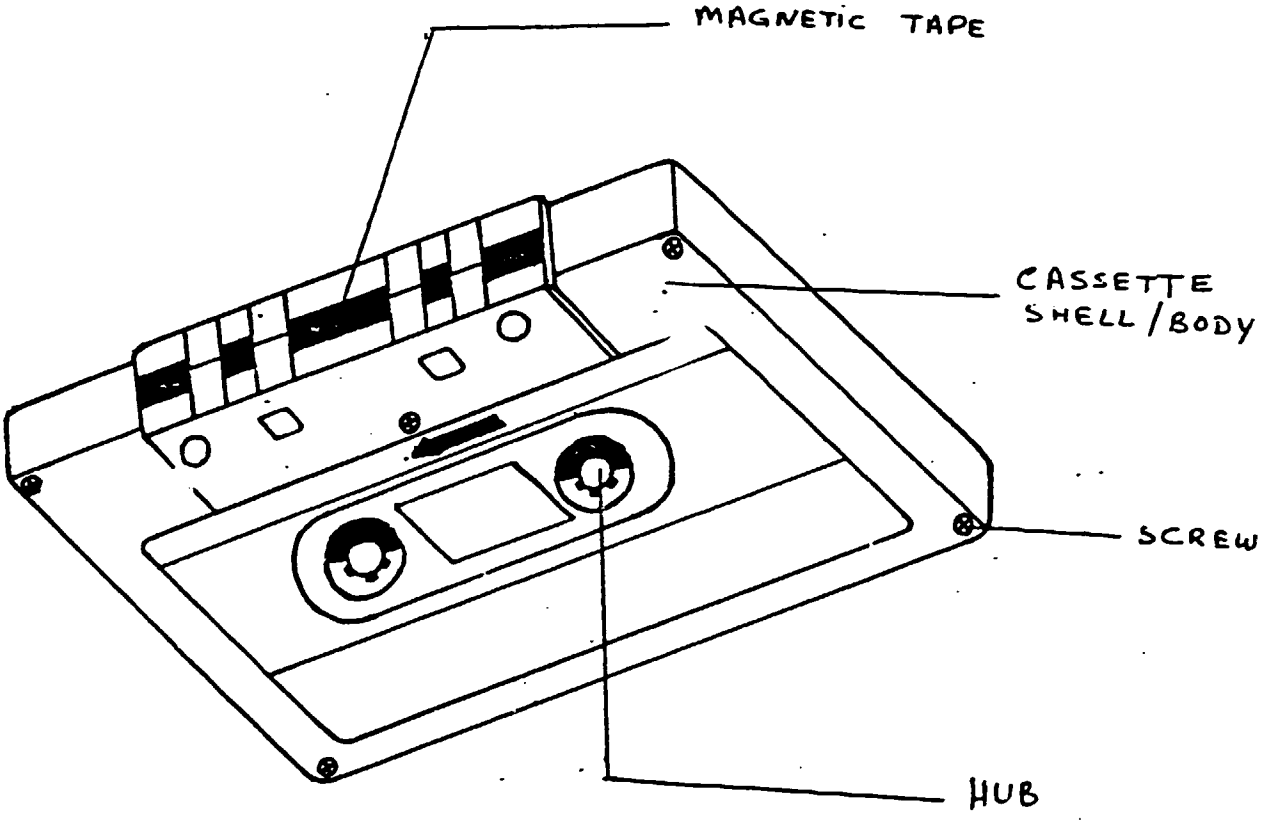

FIG. 1

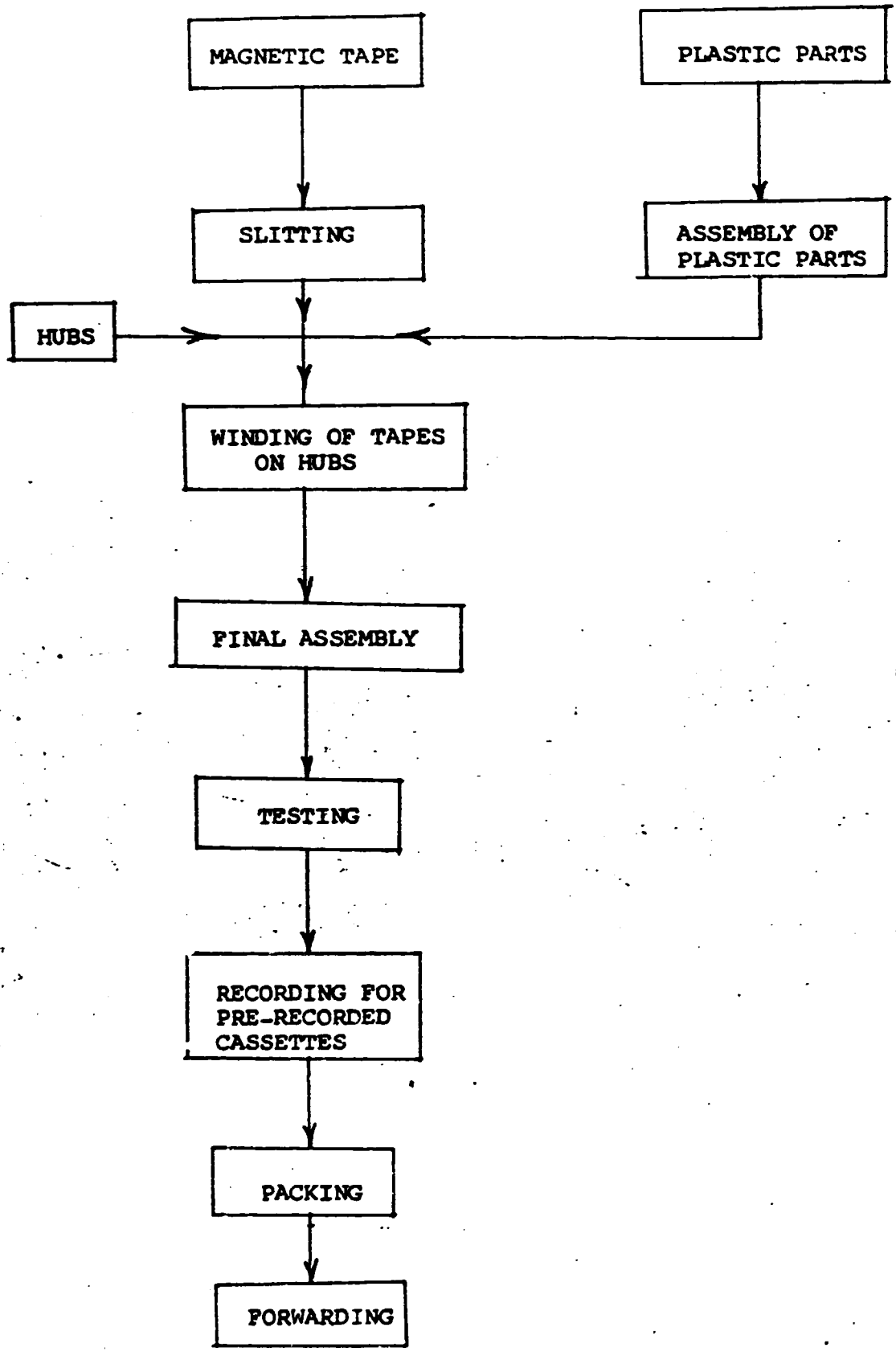
MAGNETIC TAPE
PLASTIC PARTS
SLITTING
ASSEMBLY OF PLASTIC PARTS
HUBS
WINDING OF TAPES ON HUBS
FINAL ASSEMBLY
TESTING
RECORDING FOR PRE-RECORDED CASSETTES
PACKING
FORWARDING

FIG. 2

Annexure

1. Dusenbery Europe Ltd.,
Shuttleworth Road,
Bedford MK41 OHS
UK.

2. Finetape USA Inc.
911, No Citrus Ave
Hollywood,
California-90038
USA.

3. Philips Intl Bv,
Scientific & Indl Equipment Div.
Dept.G
TQ 111-4 Eindenhoven
Neitherlands.

4. Tektronix Inc,
Dept.G
P.O.Box 500
Y3-314 Beaverton Oregon 97077
USA

AUTOMOTIVE BATTERY CHARGERS(INCLUDING HIGH CAPACITY QUICK CHARGERS) PRODUCTION PLANT PROFILE

INTRODUCTION

The battery charger is a device for charging Lead acid batteries. This is used both for new and used batteries. In addition to the normal charging facilities, the battery charger offers several other facilities like automatic cutoff once the battery is fully charged; overcharging and undercharging indication and protection circuits etc.

A photograph and a circuit diagram of a typical battery charger are shown in Fig.1 and 2 respectively.

SPECIFICATIONS(TYPICAL)

Charging voltage range	: 6 to 24V
Charging current range	: 1 to 30A
Input voltage	: 220V

Features

1. Auto cut-off
2. Over/under voltage protection

MARKET

Lead acid battery is a work horse for all types of vehicles like passenger cars, trucks, buses, etc. They also find application in automobile repair shops, R&D and educational laboratories, computer establishments, etc. However, to make the battery operational, it is important that it is charged properly for which there is need for a battery charger. Accordingly, with the increase in industrial activities in developing countries, the demand for batteries and battery chargers is bound to grow rapidly.

..../2.

ASSEMBLY PROCESS

It is proposed to purchase all the components from outside and assemble them together. The assembly of battery chargers involve mounting and soldering of electronic components on a PCB, final assembly in a metal housing, testing and packing. Before putting the components on PCB, they are sample tested so as to ensure that they meet required specifications.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 5,000 nos of automotive battery chargers. Incidentally, this is the minimum economically viable capacity keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Voltmeters (0-30V)
2. Ammeters (10-50A)
3. Power supplies (0-30V)
4. Voltage stabilisers
5. Multimeters
6. Drilling machine
7. Hand tools like nose pliers, tweezers, cutters, screw driver sets etc.

FOB(India)price of machinery & equipment: US$ 20,000(approx).

REQUIRED RAW MATERIALS AND COMPONENTS

1. Transformers
2. Rectifiers
3. SCR's
4. Zeners
5. Transistors
6. Diodes
7. Resistances
8. Capacitors
9. Pots
10. Lamps,fuses, fuse holders and on-off switches.

..../3.

11. Chasis
12. Connecting leads
13. Battery clamps

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 20 KVA
Power consumption/month	: 2200 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing/Purchase Manager	: 1
Marketing/Purchase Assistants	: 2
Testing & Inspection Staff	: 2
Skilled Workers	: 8
Semi-skilled Workers	: 4
Unskilled Workers	: 3
Administration & Accounts	: 4
	25

REQUIRED AREA FOR PLANT SITE

Building	: 500 sq.meters
Land	: 1000 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of automotive battery chargers. They can be manufactured/assembled in any moderately clean surroundings. The factory should preferably be situated close to a big city where the item is likely to have greater demand.

DIVERSIFICATION PROGRAMME

Once the unit is fully established, voltage regulators for automobiles, car theft alarm etc. can also be produced utilising almost the same production facilities and market.

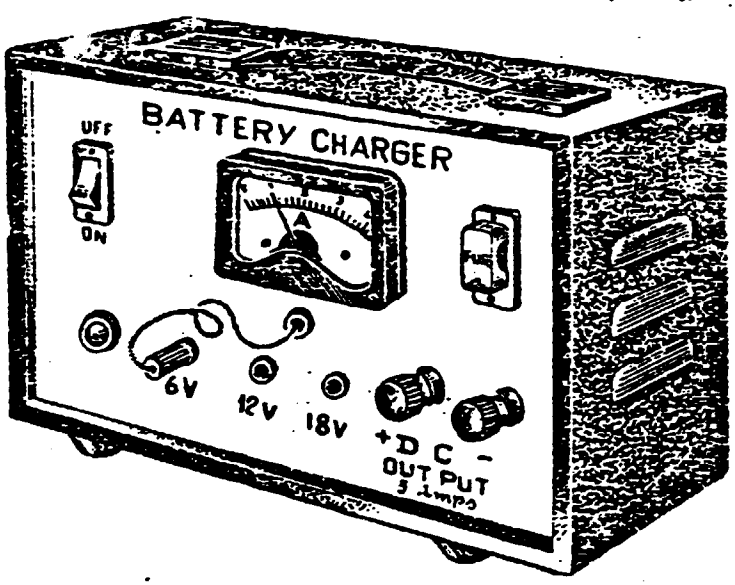

FIG. 1

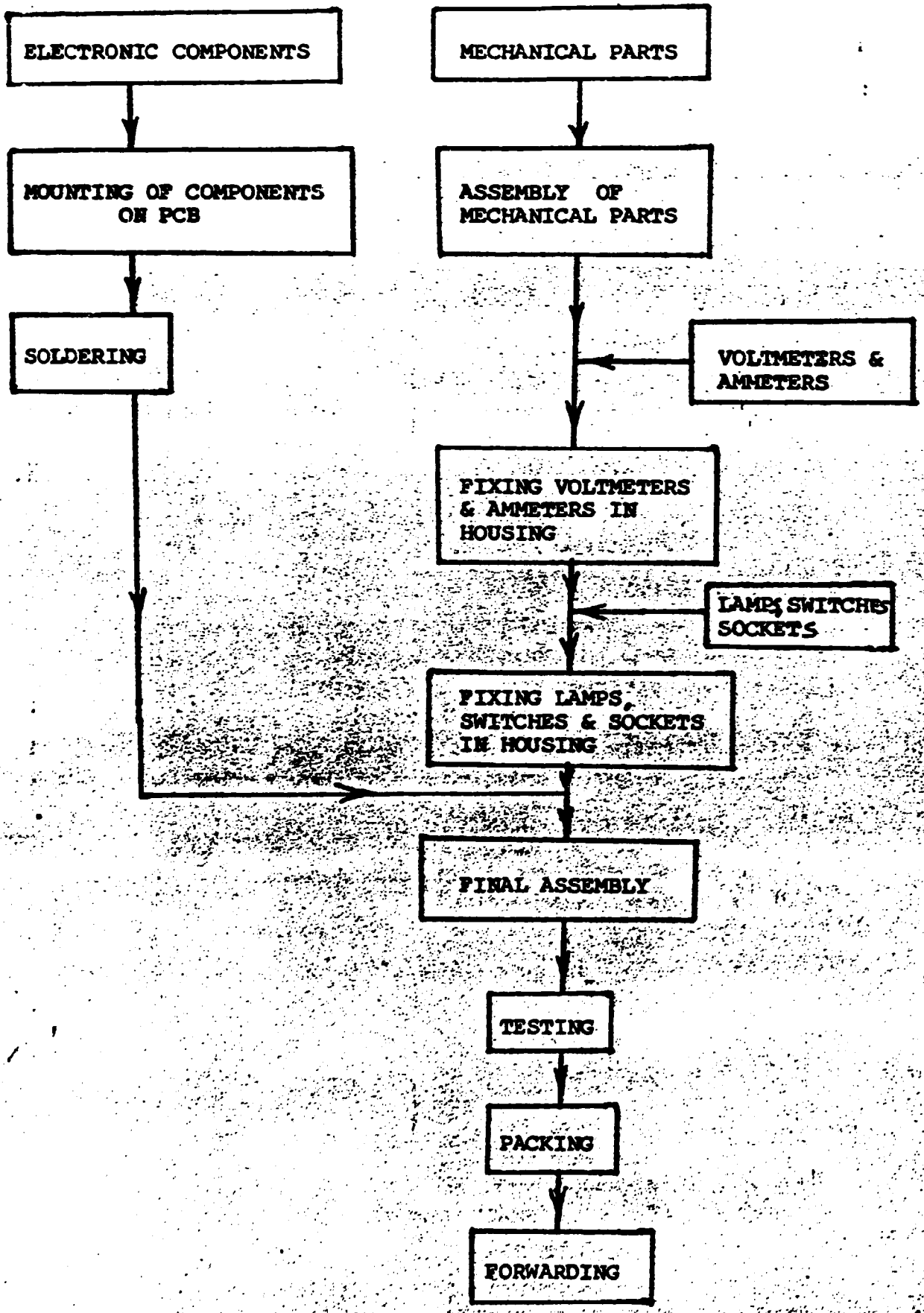
ELECTRONIC COMPONENTS
MECHANICAL PARTS
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF MECHANICAL PARTS
SOLDERING
VOLTMETERS & AMMETERS
FIXING VOLTMETERS & AMMETERS IN HOUSING
LAMPS, SWITCHES SOCKETS
FIXING LAMPS, SWITCHES & SOCKETS IN HOUSING
FINAL ASSEMBLY
TESTING
PACKING
FORWARDING

Fig.3

ANNEXURE

INDIA

1. Applied Electronics Limited
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A-5 Wagle Indl. Estate
Thane - 400 604
Mahrashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
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New Delhi - 110 019.

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4 Batliboi & Co.Limited
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5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi - 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road, Chakala,
Andheri (East)
Bombay - 400 093.

OTHER COUNTRIES

7. Philips Intl Bv.,
Scientific & Indl.Equipment Div.,
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TQ 111-4 Eindenhoven
Neitherlands.

8. M/s TRUMPF GMBH
STUTTGART
D-7257-DITZINGEN-1
FRG.

9. O.K.Industries INC.
3455, Corner Street
New York - 10475.
U.S.A.

10. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
New York-12205
USA.

LOW COST INSTRUMENTATION: SIGNAL AND/OR FUNCTION GENERATOR, DIGITAL pH METER PRODUCTION PLANT PROFILE

INTRODUCTION

(A) Signal Generator

The signal generator is very useful for alignment of RF and IF stages in radios and TVs. It also serves as a signal injector for fault finding.

(B) Digital pH Meter

The digital pH meter measures pH value of a solution. A neutral solution is defined as having a pH value of 7. An acid has a pH value of 0-7 depending upon its acidic strength while a base solution has a pH value of 7-14.

The sensor gives an analogue output depending on the pH value of the testing solution. This is converted to a digital signal in an A/D circuit which is then displayed with a high degree of accuracy. Minute variations are taken care of by a feedback circuit.

Photographs and block diagrams of Signal Generator and pH Meter are shown in Figs.1, 2 and 3, 4 respectively.

SPECIFICATIONS (TYPICAL)

(A) Signal Generator

Variable Frequency	: 30 Hz to 30 KHz
Variable Output	: 2mV to 25V into 600 Ohms
Frequency Stability	: ± 0.1%
Distortion	: Less than 1%

(B) Digital pH Meter

Range	: 0 to 14 pH
Accuracy	: ± 0.1%

..../2.

Resolution	: ± 0.1 pH
Display	: 3½ digits, LED/LCD
Operating Voltage	: 9 V DC

MARKET

(A) Signal Generator

Because of its very extensive applications in R&D, production, servicing/maintenance centres etc., the demand for this product is quite large and is expectedto grow still higher because of expanding electronics industry.

(B) Digital pH Meter

A pH Meter finds wide applications in soil test and other laboratories dealing with chemical solutions, chemical and pharmacetical industries, etc. With increase in industrial activity and modernisation of agriculture, the demand for pH meters is bound to grow in the developing countries.

ASSEMBLY PROCESS

It is basically an assembly oriented industry where normally all the electronic components, hardware and cabinets are bought out parts. The electronic components are mounted on the printed circuit boards as per the circuit details. Components are soldered and checked properly for any dry solder. This is important because stability and accuracy are important parameters in test equipment. The equipment is properly tested and calibrated before packing.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 1,000 nos each of signal generators and pH meters. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscopes (0-25 MHz)
2. Multimeters (3½ digit)
3. Frequency Counter (25 MHz)
4. Soldering irons
5. Voltage Stabilisers
6. Drilling Machine
7. Hand tools like cutters, pliers, strippers, etc.

FOB(India) price of machinery & equipment: US$ 60,000 (approx)

.../3.

REQUIRED RAW MATERIALS AND COMPONENTS

1. ICs
2. Potentiometers
3. Transistors & Diodes
4. Resistances
5. Capacitors
6. Digital Panel Meters
7. pH Electrodes
8. Printed Circuit Boards
9. Transformers
10. pH solutions (standard)
11. Cabinets
12. Miscellaneous items like switches, etc.

SCURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 50 KVA
Electricity consumption/month	: 5500 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing Manager	: 1
Purchase Manager	: 1
Marketing/Purchase Assistants	: 4
Testing & Inspection Staff	: 5
Skilled Workers	: 10
Semi-skilled Workers	: 5
Unskilled Workers	: 3
Administration & Accounts	: 4
	34

REQUIRED AREA FOR PLANT SITE

Building	: 750 sq.meters
Land	: 1500 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.5.

..../4.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of signal generators and digital pH meters. They can be assembled in any moderately clean surroundings. The building should preferably be of RCC structure to minimise dust.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, other test equipment like multimeters, frequency counters, etc. can also be produced utilising almost the same production and marketing facilities.

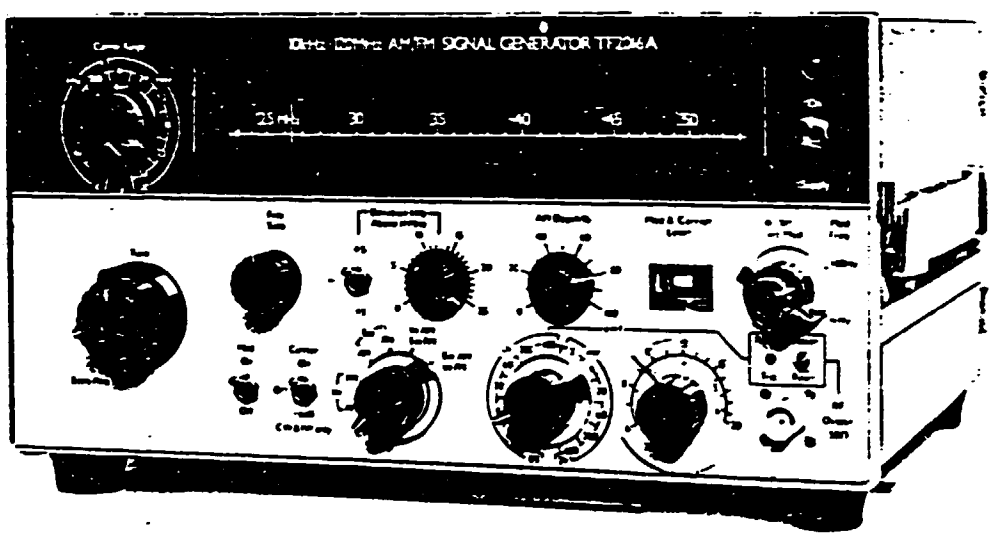


Fig.1

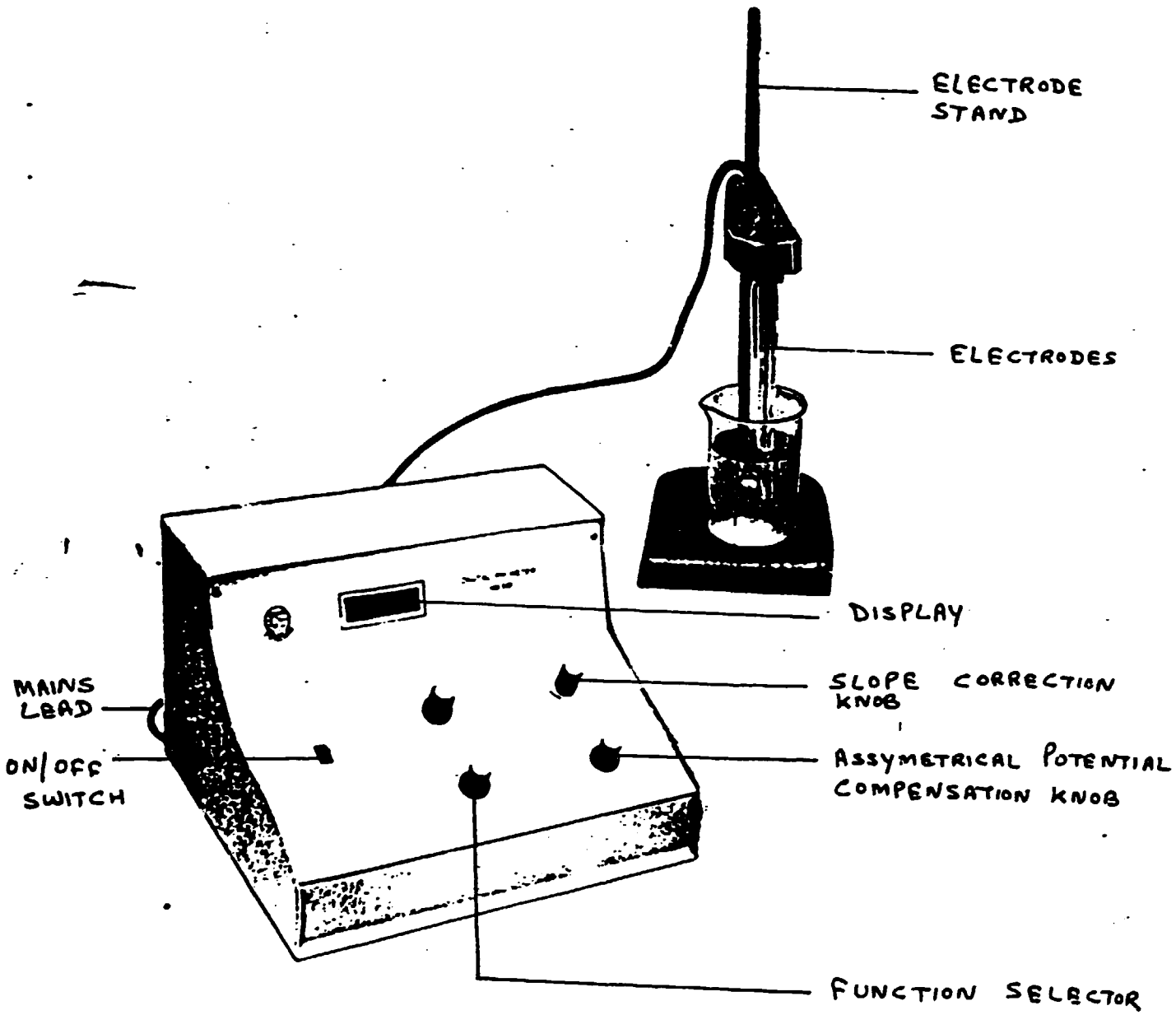

ELECTRODE STAND
ELECTRODES
DISPLAY
SLOPE CORRECTION KNOB
ASSYMETRICAL POTENTIAL COMPENSATION KNOB
MAINS LEAD
ON/OFF SWITCH
FUNCTION SELECTOR

Fig. 2

SIGNAL GENERATOR

BLOCK DIAGRAM

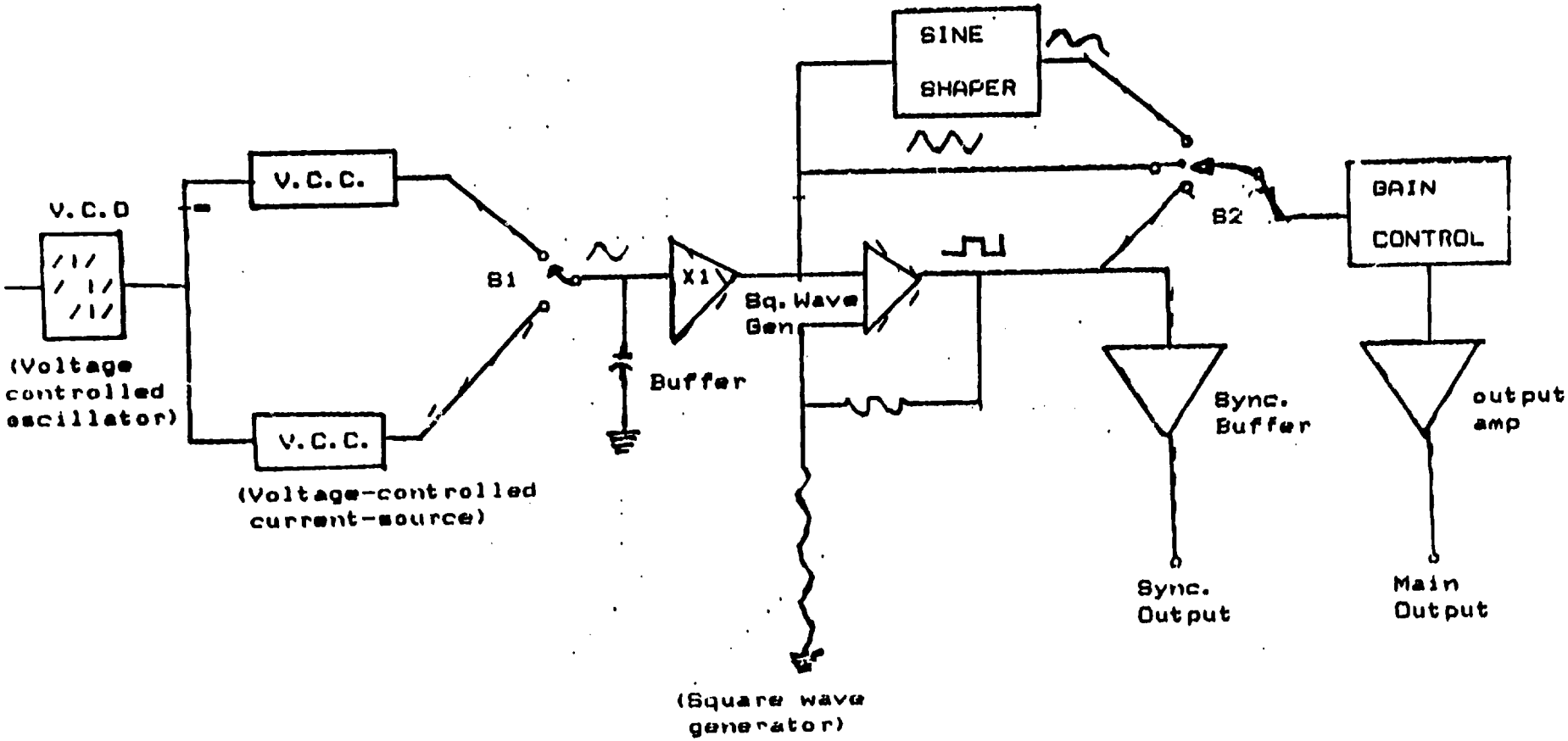


FIG.3

DIGITAL pH METER

BLOCK DIAGRAM

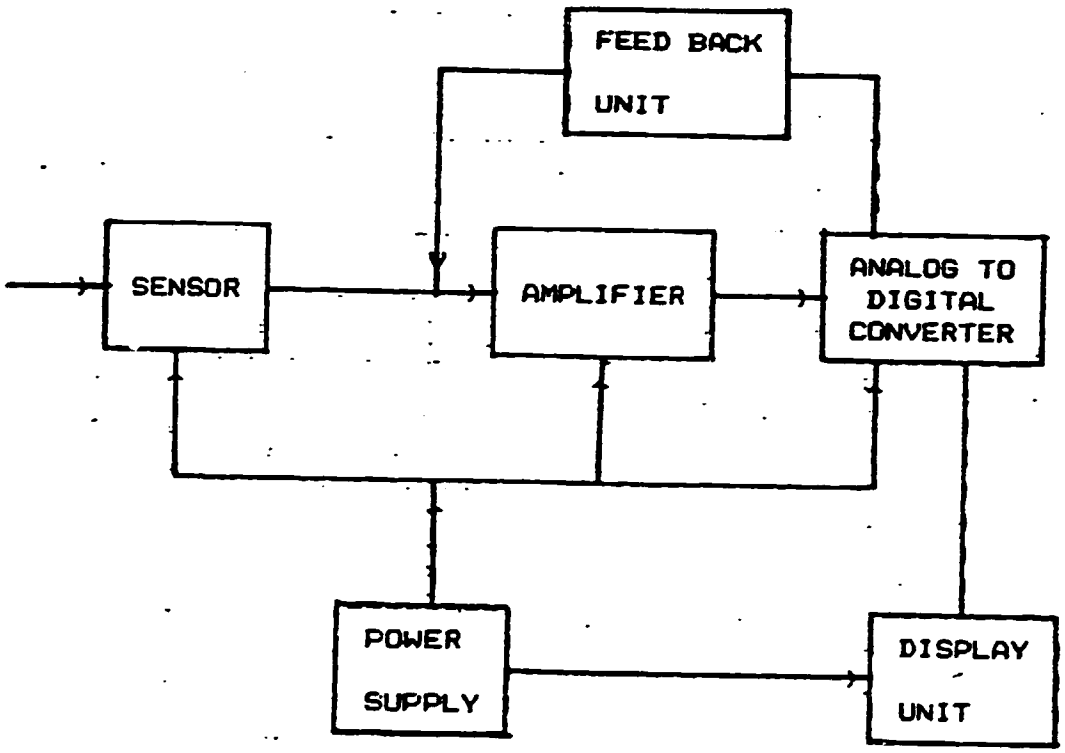


FIG.4

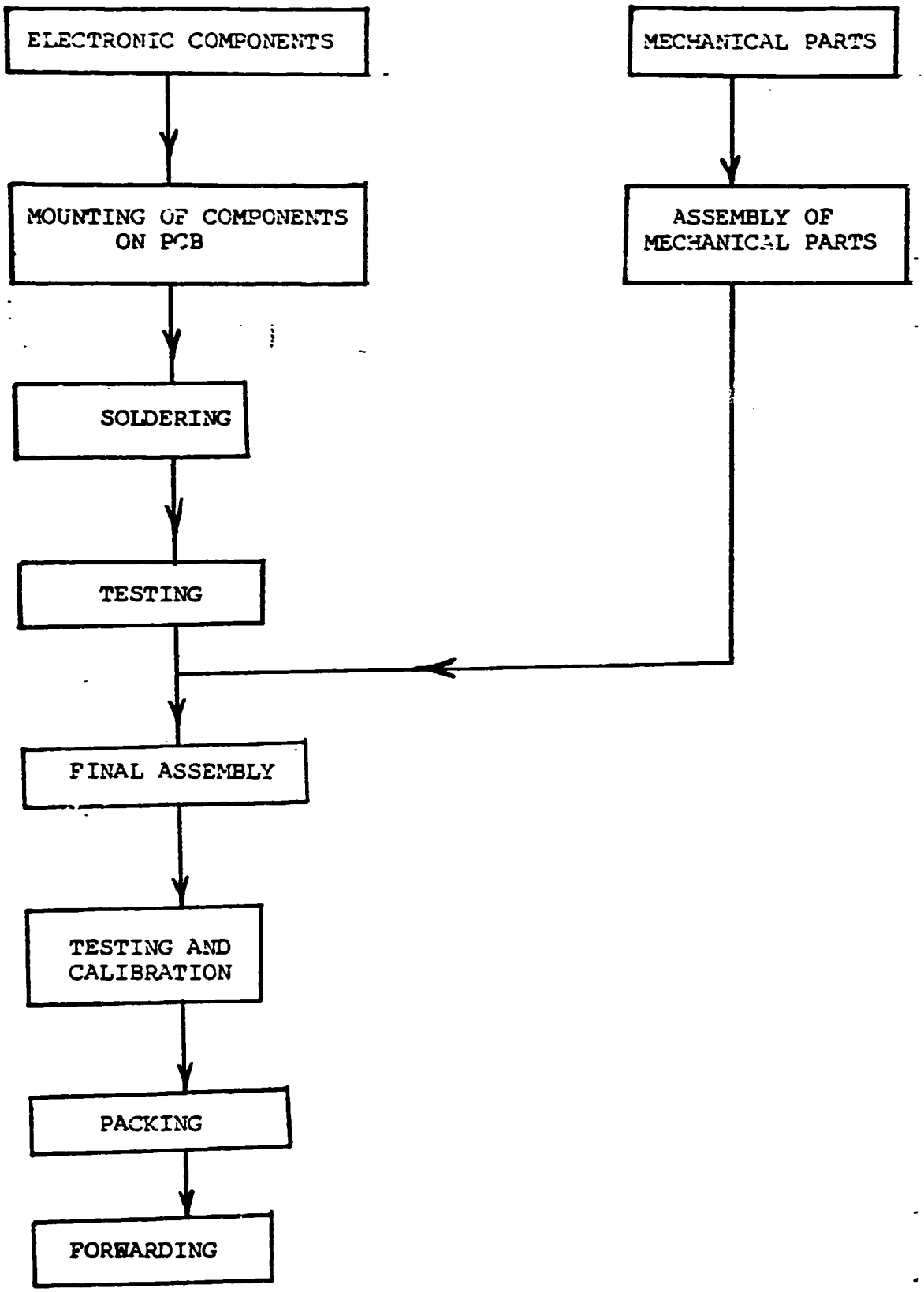

ELECTRONIC COMPONENTS
MECHANICAL PARTS
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF MECHANICAL PARTS
SOLDERING
TESTING
FINAL ASSEMBLY
TESTING AND CALIBRATION
PACKING
FORWARDING

FIG.5

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate
Thane - 400 604
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi - 110 019.

3. Phillips India Limited
Annie Besant Road
Shiv Sagar Estate
Bombay.

4. Batliboi & Co.Limited
Jeevan Vihar Building
Sansad Marg,
New Delhi - 110 001.

5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi - 110 001.

6. The National Radio & Electronics Co.Limited
Mahakali Caves Road, Chakala,
Andheri (East)
Bombay - 400 093.

OTHER COUNTRIES

7. Phillips Intl Bv,
Scientific & Indl.Equipment Div.
Dept. G,
TQ111-4 Eindenhoven
Neitherlands.

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany,
New York-12205,
USA

9. Tektronix Inc,
Dept. G.,
P.O. Box 5[illegible]0,
Y3-314 Beaverton Oregon-97077
USA.

...2/.

10. Gould Instrument Limited,
Design & Test System Division
Deptt. G, Rocbuck Road,
Hainault Essex 1G63UE
UK.

11. M/s TRUMPF GMBH
STUTTGART
D-7257 - DITZINGEN - 1
FRG.

12. O.K. Industries INC.
3455,Corner Street
New York - 10475
USA.

LOW COST SINGLE CHANNEL 5-10 MHZ OSCILLOSCOPE PRODUCTION PLANT PROFILE

INTRODUCTION

Oscilloscope is an important test equipment which finds usage in educational institutions, electronics industry and service centres. It is used as an instrument for displaying waveforms on the screen of a cathode ray tube (CRT). It is used to analyse voltages, currents and frequency parameters. A photograph and a block diagram of a typical oscilloscope are shown in Fig.1 and 2 respectively.

SPECIFICATIONS(10 MHz)

Bandwidth	: DC to 10 MHz
Sensitivity	: 5 mV/Cm at full bandwidth
Time base Sweep range	: 0.5 u sec/cm to 0.2 sec/cm
CRT Display	: 8 cm x 10 cm

MARKET

Because of its very extensive applications in educational and R&D institutions, electronics industry, servicing/maintenance centres etc., the demand for this product is quite large and is expected to grow further because of expanding electronics industry. It is also used in process industries, along with control instrumentation.

ASSEMBLY PROCESS

The oscilloscope circuit can be divided into eight parts;

1. CRT
2. The beam intensity and focusing system

..../2.

3. Vertical deflection amplifier
4. Horizontal deflection amplifier
5. Time base system
6. Syncronising system
7. Intensity modulation system
8. Power supply system

It is basically an assembly oriented industry where normally all the electronic components, hardware and cabinets are bought out parts. The electronic components are mounted on the printed circuit board (PCB) as per the circuit design. Components are soldered, and checked properly for any dry solder. This is to be done with special care because stability and accuracy are very important parameters in test equipment.

Cathode ray tube is tested for its operative voltage and then fitted in CRT holders. Final assembly of CRT, PCB and the cabinet is then carried out.

The oscilloscope is properly tested and caliberated before packing. The oscilloscope is mainly tested for amplification, bandwidth and focusing. For use in defence establishments etc, environmental tests may also be carried out.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 1,000 nos of oscilloscopes. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscope Caliberator (50 MHz)
2. Signal Generator (15 MHz)
3. Frequency Counter (15 MHZ)
4. Multimeters (3½ digit)
5. Power Supplies (0-30V, 2A)
6. Oscilloscope (15 MHz)
7. Voltage Stabilizer
8. Pulse Generator
9. V.T.V.M.
10. Square Wave Generator
11. Coil Winding Machine
12. Soldering Irons

..../3.

13. Small Lathe
14. Grinding Machine
15. Work Benches
16. Hand Tools

REQUIRED RAW MATERIALS AND COMPONENTS

1. PCBs
2. Power Transformers
3. Cathode Ray Tubes
4. Deflection Yokes
5. ICs
6. Diodes
7. Transistors
8. Potentiometers
9. Electrolytic Capacitors (High Voltage)
10. Resistors
11. Porcelain Terminal Strips
12. Misc items like switches, neon indicators, fuses etc.

SOURCES OF SUPPLY

All equipment (except oscilloscope caliberator), raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 25 KVA
Electricity Consumption/month	: 2800 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing Manager	: 1
Purchase Manager	: 1
Marketing/Purchase Assistants	: 4
Testing and Inspection Staff	: 5
Skilled Workers	:20
Semi-skilled Workers	:10
Unskilled Workers	: 5
Administration & Accounts	: 8
	55

..../4.

REQUIRED AREA FOR PLANT SITE

Building	: 750 sq.meters
Land	: 1500 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of low cost single channel 5-10 MHz oscilloscopes. They can be assembled in any moderately clean surroundings. The factory should preferably be situated close to a cluster of electronic units and/or educational institutions.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, other test equipment like multimeters, frequency counters, signal generators etc. can also be produced utilising almost the same production and marketing facilities.

SINGLE CHANNEL 10 MHZ OSCILLOSCOPE

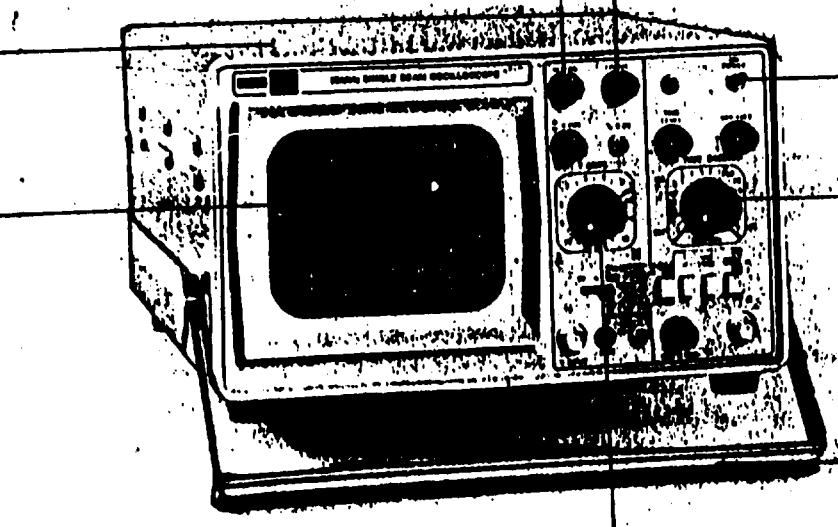
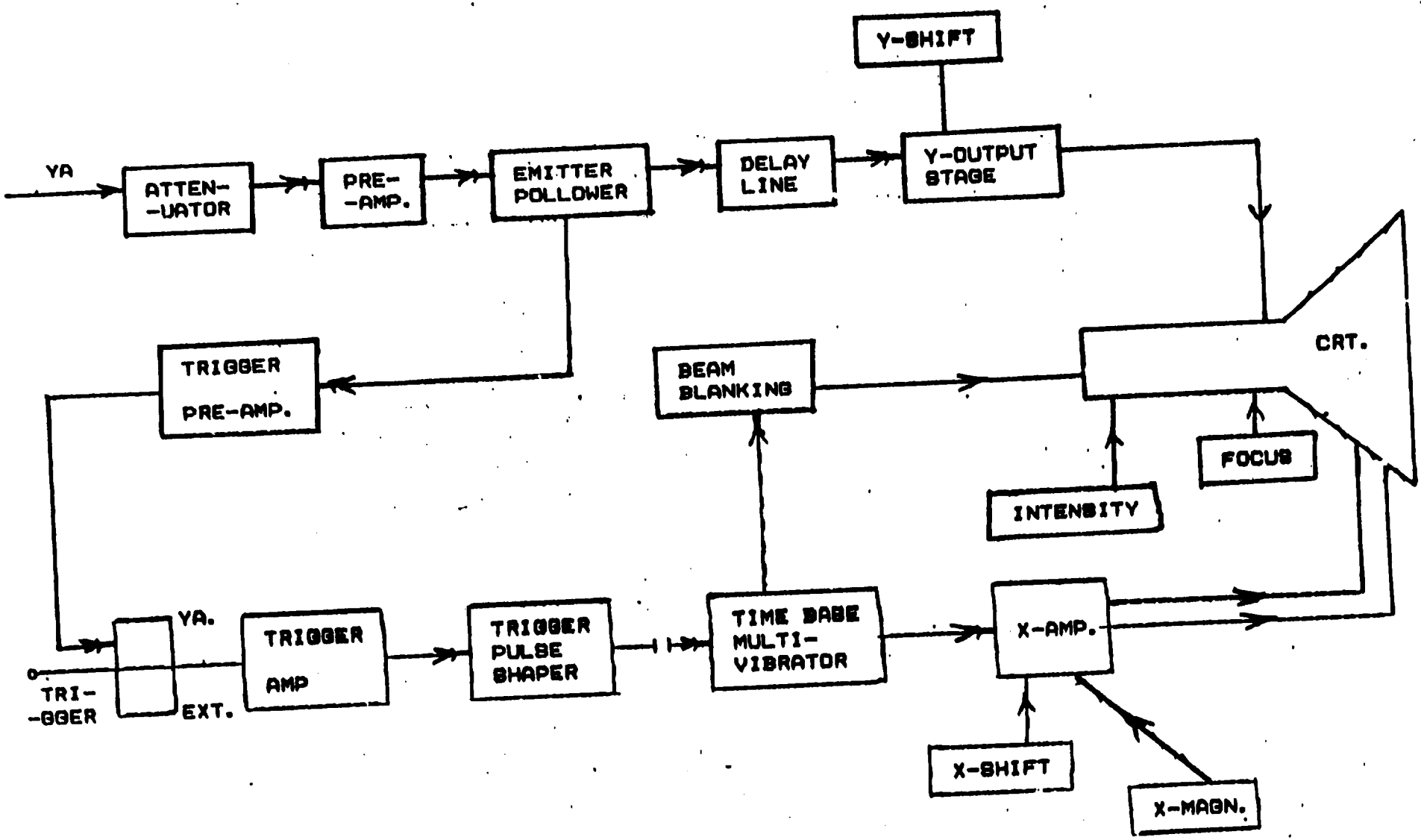


FIG.1



BLOCK DIAGRAM OF OSCILLOSCOPE

FIG.2

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate
Thane-400 604
Maharashtra.

2. Hindustan Instruments Limited
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Andheri (East)
Bombay-400 093

OTHER COUNTRIES

7. Philips Intl. Bv,
Scientific & Indl. Equipment Div.
Dept. G,
TQ111-4 Eindenhoven
Neitherlands.

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
New York-12205

9. Tektronix Inc.
Dept. G.,
P.O.Box 500,
Y3-314 Beaverton Oregon-97077
USA.

...2/.

10. Gould Instruments Limited
Design & Test System Division
Deptt.G.Rocbuck Road,
Hainault Essex 1G6 3UE
UK.

11. M/s TRUMPF GMBH
STUTTGART
D-7257 - DITZINGEN-1
FRG.

12. O.K. Industries INC.
3455, Corner Street
New York-10475
USA.

LOW COST SINGLE CHANNEL 5-10 MHZ OSCILLOSCOPE

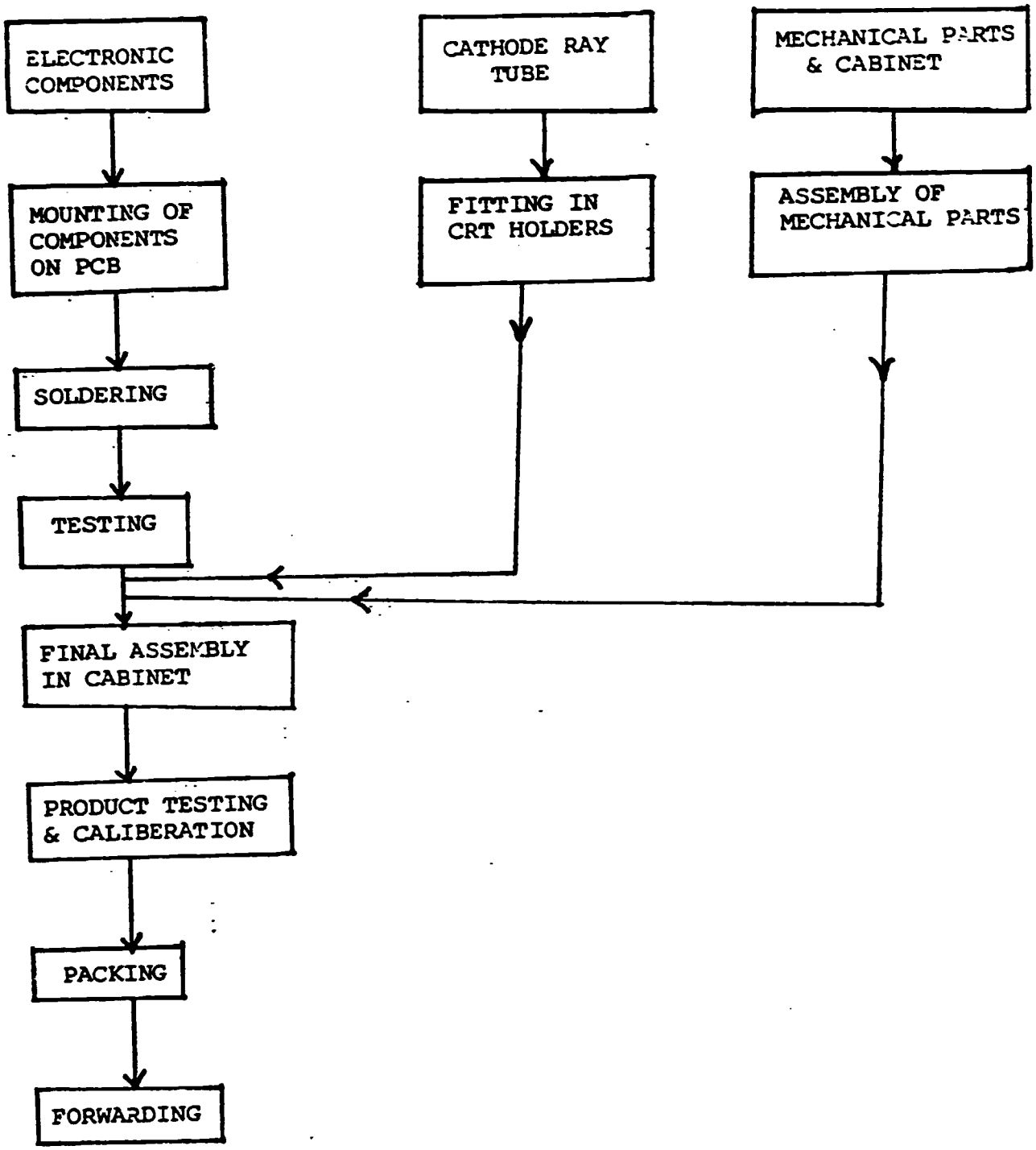

FIG.3

TV TUNERS PRODUCTION PLANT PROFILE

INTRODUCTION

A TV tuner is used to select a particular channel and pass the signals further for processing and display on the TV screen. The tuning has to be sufficiently broad to pass both the audio and video signals and yet be sufficiently narrow to reject signals from other channels. The signal received by the TV antenna is normally weak and it also carries disturbances called noise. The tuner not only amplifies the signal received by it but also improves the signal to noise ratio, thereby improving the overall quality of TV reception. Electronic tuner is preferred over the mechanical type because (1) it is more efficient, (2) its performance is consistent over a longer period, and (3) it covers a greater bandwidth (VHF and UHF).

The block diagram of a typical TV tuner is shown in Fig.1.

SPECIFICATIONS (ELECTRONIC)

Bandwidth	: Channel 1 to 12/64/99 of transmission frequency.
Impedance	: 50,75,500 Ohms

MARKET

Each TV set uses one tuner. Therefore, the demand for TV tuners is equal to the demand of TV sets. The price of a mechanical tuner is about half that of electronic tuner. For reasons of economy, in lower priced black and white TVs, mechanical tuners are preferred. However, in view of the price difference being just about Rs 70-80, for improved quality of picture, use of electronic tuners is preferred in colour TVs.

..../2.

ASSEMBLY PROCESS

A TV tuner consists of the following;

1. Channel selection switch with a fine tuning control.
2. A local oscillator unit.
3. A mixer unit.

Components such as resistors, capacitors, diodes and coils etc. are mounted on PCB as per the circuit diagram and then soldered. Tuner being a very sensitive device, quality of soldering is important. Final assembly is done in a sheet metal housing and subsequently tested for bandwidth, selectivity, gain and overal performance.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 20,000 nos of TV tuner sets. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscope : (100 MHz)
2. Signal Generator : (250 MHz)
3. Power Supply (0-30V, 1A)
4. Stabilizer (1.1 KVA, 200V-240V)
5. Digital Multimeters (3½ digit)
6. Analog Multimeters
7. Pattern Generator
8. Impedance Bridge
9. Sweep Generator
10. Digital Frequency Meter
11. Soldering Irons
12. Hand tools i.e. nose plier, cutter, screw driver set etc.

REQUIRED RAW MATERIALS AND COMPONENTS

1. Transistors
2. Capacitors
3. Resistances
4. Coils

..../3.

5. Switches
6. PCBs
7. Diodes
8. Connectors
9. Sheet Metal Housing
10. Solder Wire
11. Connecting Wires
12. Flux
13. Mechanical Chasis
14. Hardware item like nuts, bolts, screws etc.

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 10 KVA
Electricity consumption/month	: 1100 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing & Purchase Manager	: 1
Marketing/Purchase Assistants	: 2
Testing & Inspection Staff	: 2
Skilled Workers	: 8
Semi-skilled Workers	: 4
Unskilled Workers	: 3
Administration & Accounts	: 4
	25

REQUIRED AREA FOR PLANT SITE

Building	: 400 sq.meters
Land	: 800 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.2.

..../4.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of TV tuners. They can be assembled in any moderately clean surroundings. Building should preferably be of RCC structure to minimise dust. Location of the unit near TV factories would be advantageous.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, TV boosters can also be produced utilising almost the same production facilities and marketing network.

T.V. TUNER

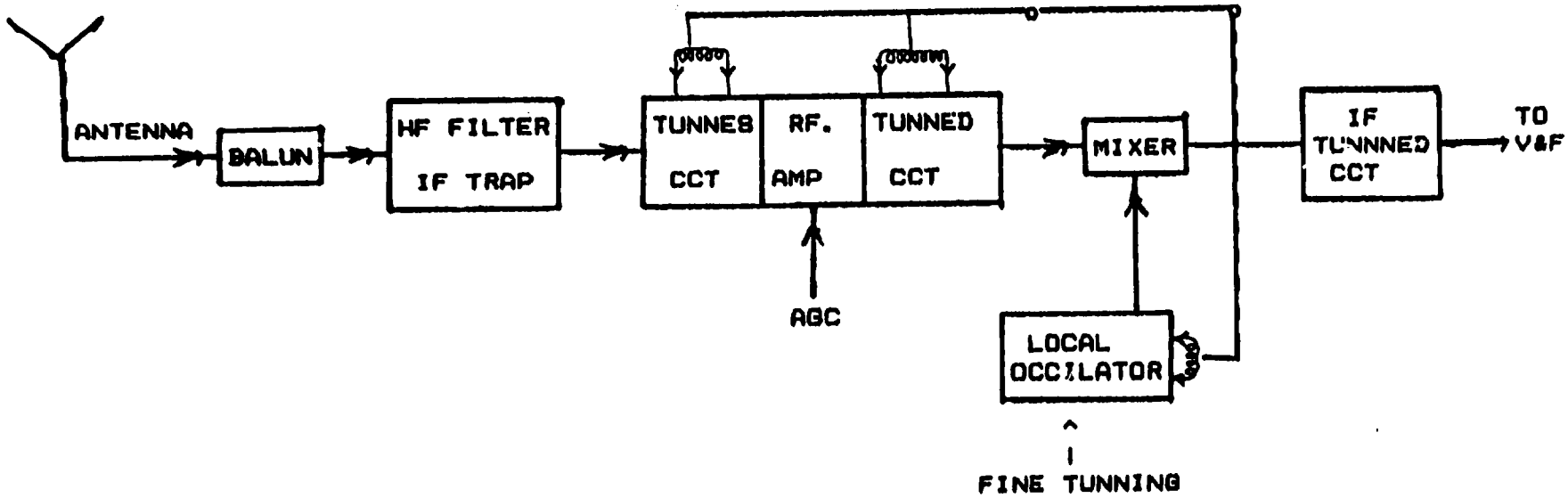

FIG.1

T.V.TUNERS

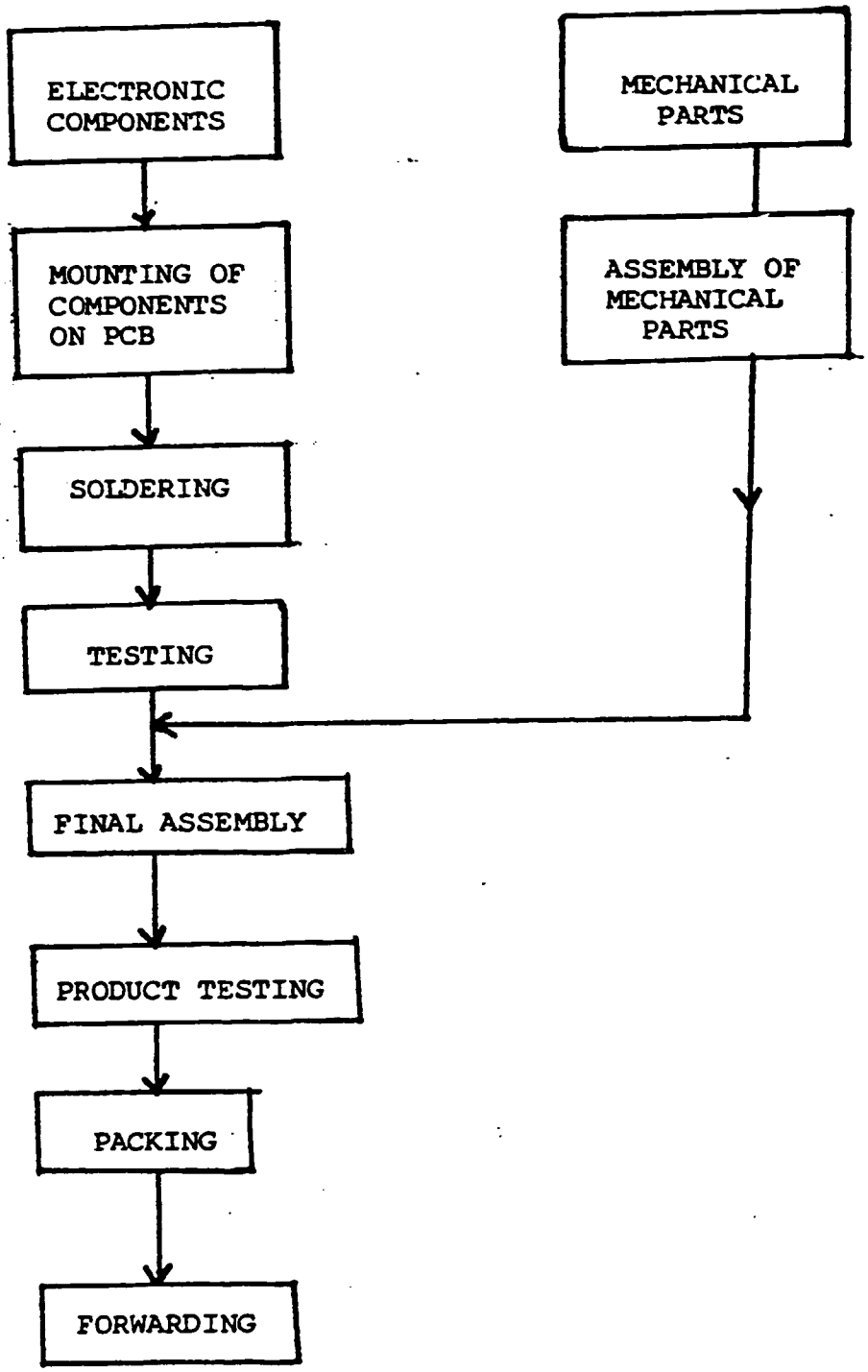

FIG. 2

Annexufe

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate
Thane-400 604
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi-110 019.

3. Phillips India Limited
Annie Resant Road,
Shiv Sagar Estate.
Bombay.

4. The National Radio & Electronics Co.Limited
Mahakali Caves Road, Chakala,
Andheri (East)
Bombay-400 093.

OTHER COUNTRIES

5. Philips Intl Bv,
Scientific & Indl.Equipment Div.
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Neitherlands.

6. M/s Hewlett Packard Co.
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USA.

8. Gould Instruments Limited
Design & Test System Division
Deptt.G.Rocbuck Road,
Hainault Essex 1G63UE
UK.

9. O.K.Industries INC.
3455, Corner Street
New York - 10475
U.S.A.

T.V. BOOSTER AMPLIFIER PRODUCTION PLANT PROFILE

INTRODUCTION

This equipment is used along with a TV set in remote areas where TV signals are weak. The signal received by an antenna of a TV set is subjected to many stmospheric obstacles in its travel from transmission point to the receiver. The loss in strength of the signal is proportional to the distance between transmitter and the receiver. In remote areas, the TV signal received is considerably weak. Booster performs the function of amplifying or strengthening the signal, thereby improving signal to noise ratio and thus reducing "snow" in the picture.

A photograph and a block diagram of a typical TV booster amplifier are shown in Fig.1 and 2 respectively.

SPECIFICATIONS (TYPICAL)

Sensitivity	: 100 nV
Gain	: 1000 in steps
Bandwidth	: Channels 1 to 12 of transmission frequencies
Operating Voltage	: 220V, 50 Hz

MARKET

TV booster amplifier is useful in areas where TV signal received is weak necessitating amplification of the same in order to get a clear picture without any "wash out and snow effect". As installation of a number of TV relay stations to cover the entire country is difficult in a resource scarce developing country, the need arises for use of TV booster amplifiers in remote areas.

..../2.

It would be advisable to tie up the marketing of boosters with TV manufacturers. In a developing country, about 25% TV sets are likely to be operating in remote areas and thus generating a substantial demand for TV booster amplifiers

ASSEMBLY PROCESS

Almost all the components used in the production of TV boosters are bought out parts. The components are mounted on PCBs as per circuit design and then soldered. The final product is tested for frequency response, output power and overall performance.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day, and 300 days per year, annual capacity of the plant is proposed to be 15,000 nos of TV booster amplifiers. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. TV Pattern Generator (Colour & B/W)
2. Standard TV Receiver (Colour & B/W)
3. AM & FM Signal Generator (50-500 MHz)
4. RF Voltmeter (500 MHz)
5. Oscilloscope (0-15 MHz)
6. Multimeters (3½ digit)
7. Coil Winding Machine
8. Bench Drill
9. Hand Tools

REQUIRED RAW MATERIALS AND COMPONENTS

1. Transistors
2. Capacitors
3. Resistors
4. PCBs
5. Potentiometers
6. Indicating Lamps
7. Connecting Cords and Plugs
8. Coils
9. Diodes
10. Soldering Wire
11. Hardware items like bolts and nuts etc.
12. Cabinets
13. Packing boxes

..../3.

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 15 KVA
Electricity consumption/month	: 1700 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing & Purchase Manager	: 1
Marketing & Purchase Assistants	: 2
Testing and Inspection Staff	: 2
Skilled Workers	: 6
Semi-skilled Workers	: 2
Unskilled Workers	: 2
Administration & Accounts	: 4
	20

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

Process Flow is showin in Fig.3.

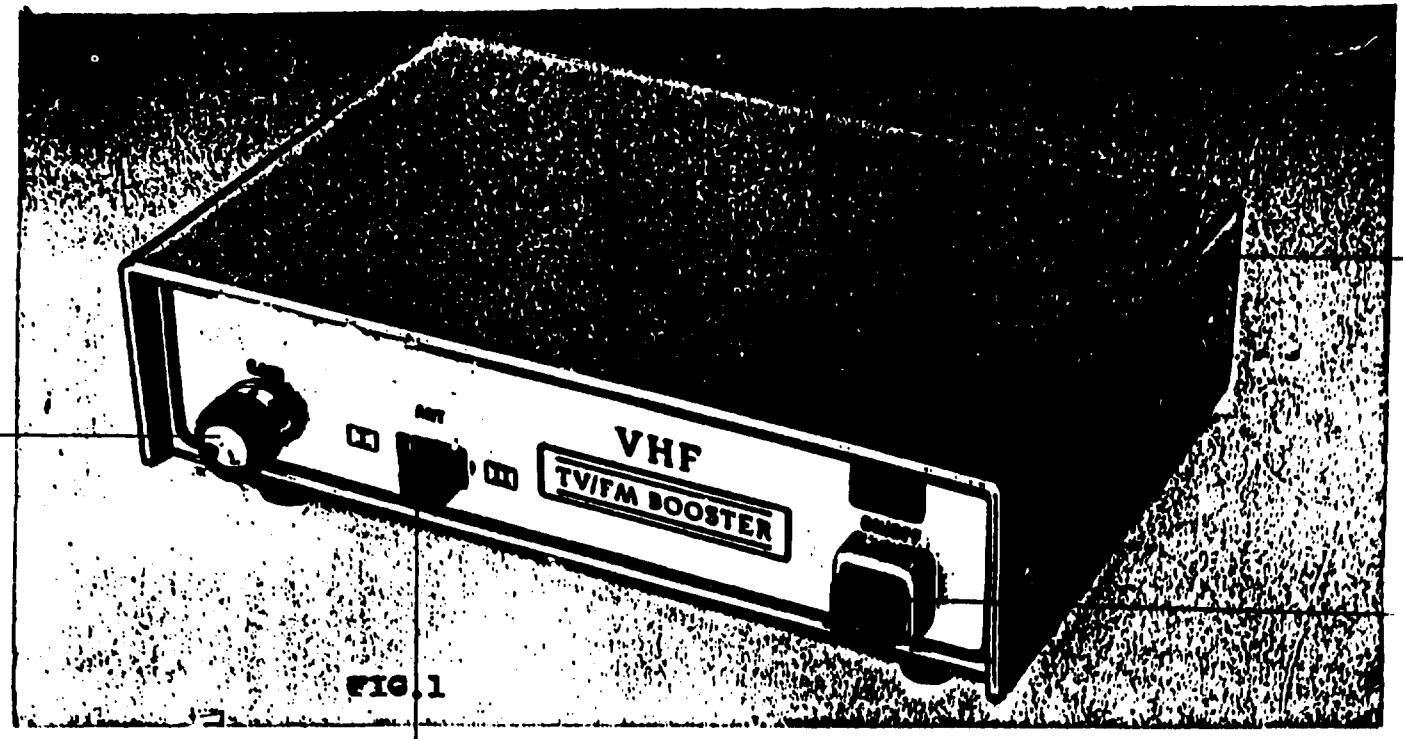
LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of TV booster amplifiers. They can be assembled in any moderately clean surroundings. Building should preferably be of RCC structure to minimise dust. Location of the factory close to TV manufacturing units would be advantageous.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, TV tuners can also be produced utilising almost the same production facilities and marketing network.

T.V.BOOSTER AMPLIFIER



GAIN SWITCH

CABINET

ON/OFF SWITCH

CHANNEL SELECTION SWITCH

FIG.1

Annexure

INDIA

1. Applied Electronics Limited
APLAB House
A-5 Wagle Indl. Estate
Thane-400 604
Maharashtra.

2. Hindustan Instruments Limited
704, Vishal Bhavan
95, Nehru Place
New Delhi-110 019.

3. Phillips India Limited
Annie Besant Road
Shiv Sagar Estate
Bombay.

4. Batliboi & Co. Limited
Jeevan Vihar Building
Sansad Marg,
New Delhi-110 001.

5. HMT Limited
Jeevan Tara Building
Sansad Marg
New Delhi-110 001.

6. The National Radio & Electronics Co.Limited
Mahalali Caves Road, Chakala,
Andheri(East)
Bombay-400 093.

OTHER COUNTRIES

7. Philips Intl Bv,
Scientific & Indl. Equipment Div.
Dept. G,
TQ111-4 Eindenhoven
Neithe.lands

8. M/s Hewlett Packard Co.
5 Computer Drive South
Albany
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.../2.

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11. M/s TRUMPF GMBH
STUTTGART
D-7257-DITZINGEN-1
FRG.

12. O.K.Industries INC.
3455,Corner Street,
New York-10475
USA.

ELECTRONIC CLOCKS PRODUCTION PLANT PROFILE

INTRODUCTION

Electronic clocks are quartz controlled and use sophisticated components like large scale integrated circuits (LSIs), light emitting diodes (LEDs) etc. Electronic clocks give very accurate time and are reasonably priced. The latest electronic clocks come with either digital or hand displays. They are available in different models like table top and wall mounting type. Miniature models for use in automobiles and for giving gifts are also available.

A photograph and a block diagram of a typical electronic clock are shown in Fig.1 and 2 respectively.

SPECIFICATIONS (TYPICAL)

Display	: 3½ digit
Accuracy	: ± 1 second/day
Additional facilities	: Month & date, alarm, hourly chime, AM/PM display

MARKET

The demand for electronic clocks because of their high accuracy and low price is bound to be very large for years to come. Incidentally, prices of electronic clocks have been falling steadily for over a decade due to fall in prices of mass produced components like LSIs, LEDs, etc. Another attractive feature of these clocks is their long life and minimal need for repairs when compared with mechanical types. Clocks are used in home, industry, laboratories, offices, etc.

ASSEMBLY PROCESS

Components which are mostly bought out are soldered on the printed circuit board. The assembly, at various stages, is tested for its operational functions. Once the assembly is completed in all respects, it goes for final tests and calibration. It is then packed for despatch.

..../2.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 10,000 nos of electronic clocks. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Oscilloscope (0-25 MHz)
2. Power Supply (0-30V, 1A)
3. Frequency Counter (0-600 MHZ)
4. Digital Multimeter ($3\frac{1}{2}$ digit)
5. Pulse Generator
6. Soldering Irons
7. Hand tools like miniature cutter, nose pliers, wire stripper, screw drivers (various sizes), etc.

REQUIRED RAW MATERIALS AND COMPONENTS

1. Quartz crystal module
2. ICs
3. LEDs
4. Diodes
5. Capacitors
6. Trimmers
7. Resistances
8. PCBs
9. Transformers
10. Solder Wire
11. Switches
12. Speakers
13. Batteries
14. Cabinets

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could be procured from other countries like U.K., West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

..../3.

REQUIRED UTILITIES

Electric Power	: 10 KVA
Electricity consumption/ month	: 1100 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing Manager	: 1
Purchase Manager	: 1
Marketing/Purchase Assistants	: 4
Testing and Inspection Staff	: 4
Skilled Workers	: 10
Semi-skilled Workers	: 5
Unskilled Workers	: 3
Administration & Accounts	: 6
	35

REQUIRED AREA FOR PLANT SITE

Building	: 250 sq.meters
Land	: 500 sq.meters

PROCESS FLOW SHEET

Process Flow is shown in Fig.3.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of electronic clocks. They can be assembled in any moderately clean surroundings. Building should preferably be of RCC structure to minimise dust. Location of the factory close to large cities, where the item is likely to have large demand, would be advantageous.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, electronic watches, electronic timers, etc. can also be produced utilising almost the same production facilities and marketing network.

DIGITAL CLOCK

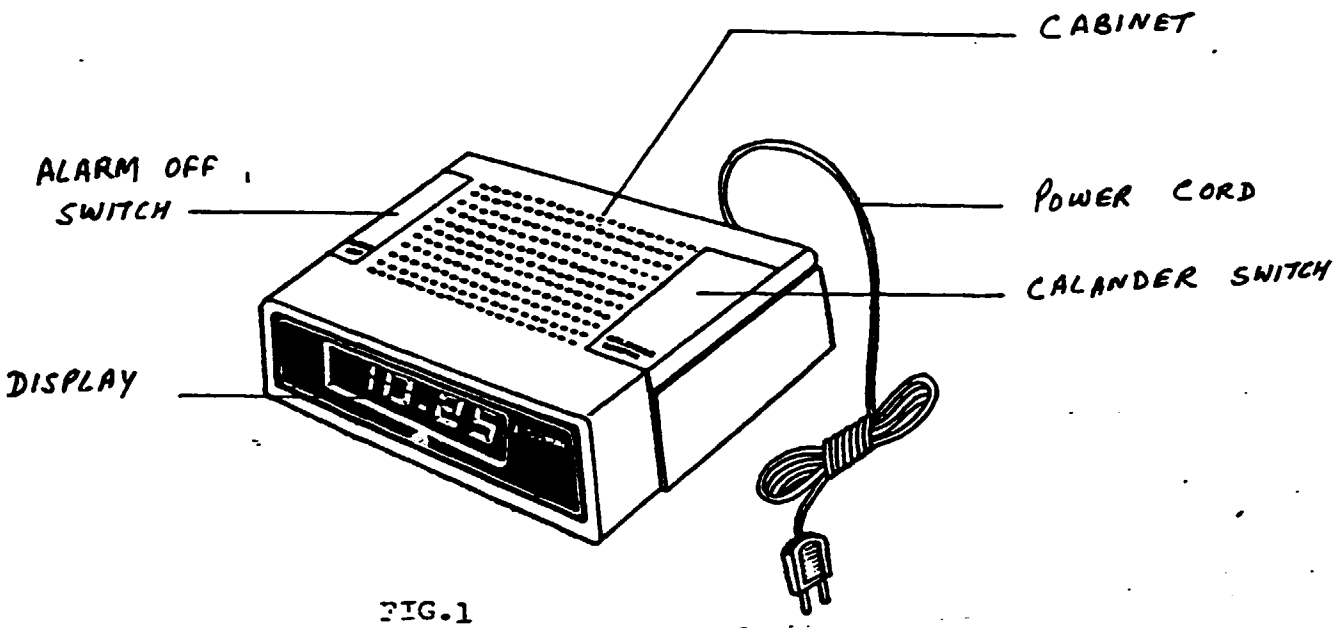

FIG.1

DIGITAL CLOCK

BLOCK DIAGRAM

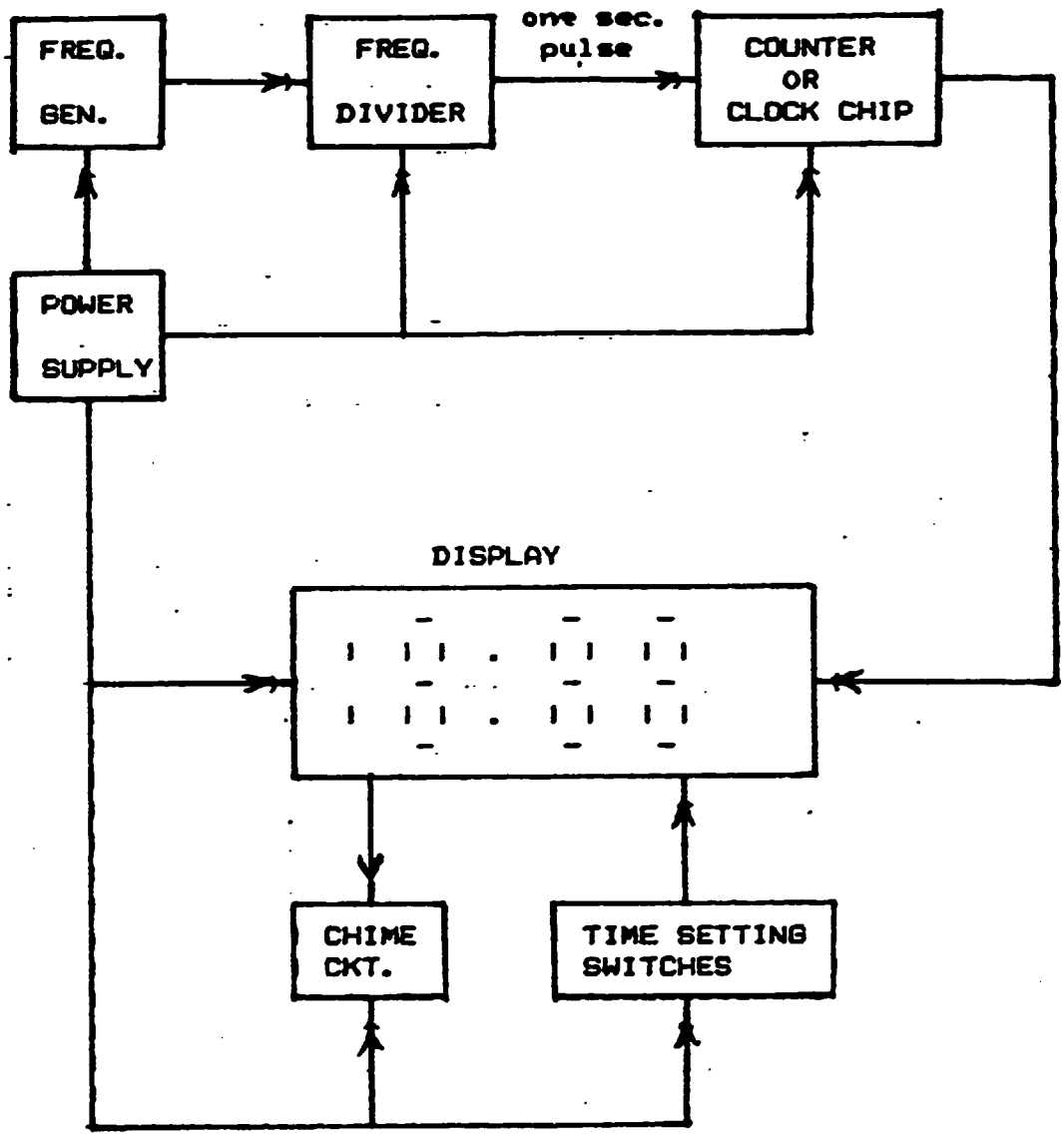

FIG. 2

DIGITAL CLOCK

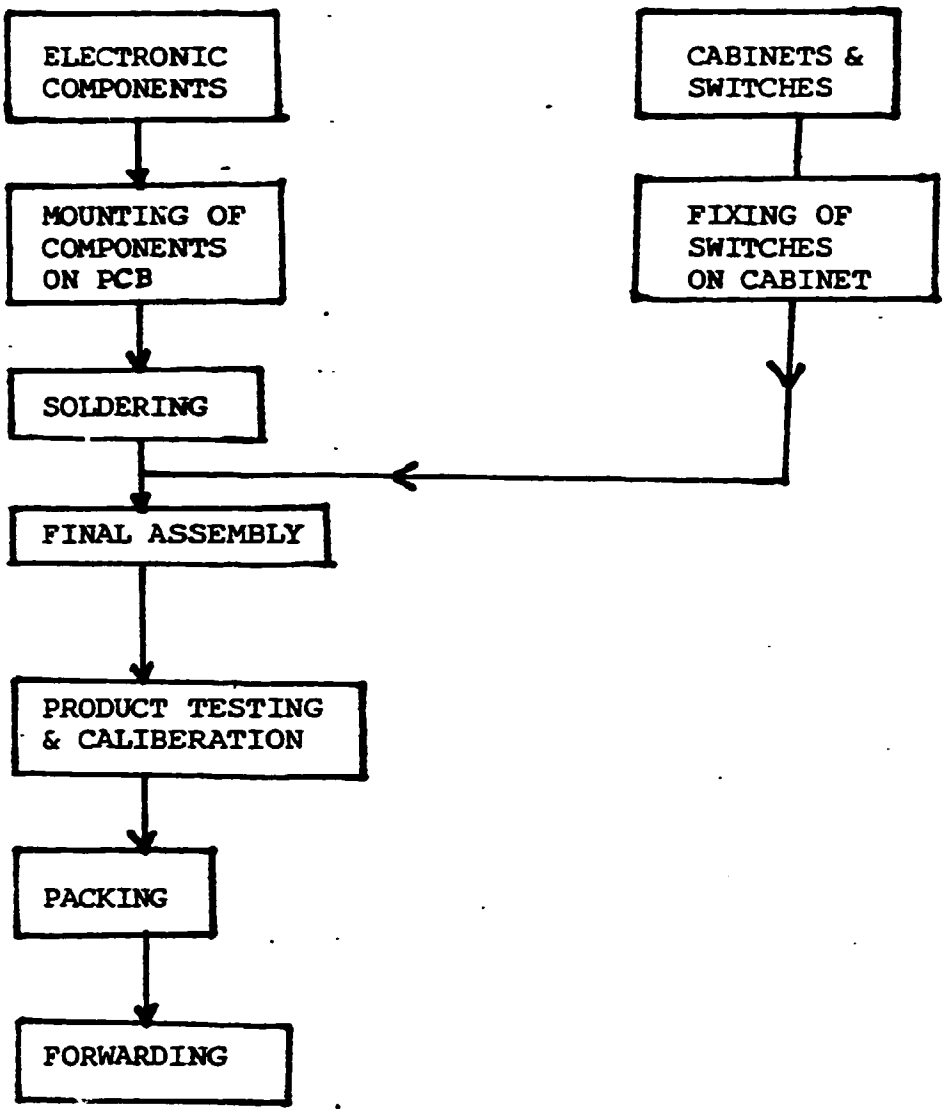

FIG.3

Annexure

INDIA

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Hainault Essex 1G63UE
UK

9. O.K.Industries INC.
3455, Corner Street,
New York-10475
USA.

INTRUDER BURGLAR ALARMS PRODUCTION PLANT PROFILE

INTRODUCTION

An intruder burglar alarm, as the name suggests, is an electronic security system which activates an alarm to indicate the violation of the protected area. The alarm generates an amplified audio output when intrusion takes place. These systems are a recent introduction as anti-theft and intrusion information devices. They are available in varying degree of sophistication, from simple domestic types to complicated defence systems. The degree of sophistication depends upon the importance and the value of protected area or the article. The intrusion can be broadly divided into the following three categories;

1. Boundary (Perimeter) intrusion
2. Space/specific area intrusion
3. Spot (Point) intrusion

A circuit diagram of a typical intruder burglar alarm system is shown in Fig.1.

SPECIFICATION (TYPICAL)

Sensor	: Light dependent resistor
Operating Voltage	: 9 Volts DC or 220 Volts, 50 Hz
Alarm level	: Audible upto 1/2 K.M.

MARKET

The electronic security system is comparatively a new concept in developing countries. However, in a short span of time, its usage has gained considerable importance because of its utility in domestic, commercial, industrial and defence establishments. As a matter of fact, the systems have become invaluable aids in internal security operations and in guarding of facilities like supply depots, air fields etc.

..../2.

If systems can be made available at a cost which is within the reach of a large population, sufficient demand can be generated. As in most developing countries, use of intruder burglar alarms has so far been limited, the success of any unit manufacturing these items would depend on creation of an awareness and understanding through demonstrations etc. and sustained marketing efforts.

ASSEMBLY PROCESS

The production of an intruder burglar alarm system consists of assembly of components on a PCB, final assembly in a housing and testing of complete system. An intruder burglar alarm system has 3 main sub-assemblies;

1. Power supply
2. Printed Circuit Board
3. Speaker

Almost all the components used in production of intruder burglar alarm systems are bought out parts. Various sub-assemblies are made as per circuit design. The final product is tested for its functional working.

PRODUCTION SCHEDULE

Based on single shift operation of 8 hours working per day and 300 days per year, annual capacity of the plant is proposed to be 2,000 nos of intruder alarm systems. Incidentally, this is the minimum economically viable capacity, keeping in view the essential, suggested machinery/equipment, space etc.

REQUIRED MACHINERY AND EQUIPMENT

1. Power Supply (0 to 30V 2 A)
2. Stabilizer (1.1 KVA, 200-240V)
3. Oscilloscope (0 to 15 MHz)
4. Multimeter (3½ digit)
5. Variacs
6. Soldering Irons
7. A.F.Output Meter
8. Hand tools like nose plier, cutter, screw driver set etc.

..../3.

REQUIRED RAW MATERIALS AND COMPONENTS

1. Speakers
2. PCBs
3. Sensors like light dependent resistors
4. Capacitors
5. Resistors
6. Transistors
7. Neon Lamps (220V)
8. Main Cord
9. Transformer
10. Bridge Rectifier
11. Power Cord
12. Flux
13. Soldering Wire
14. Connecting Wires
15. Mechanical Chasis

SOURCES OF SUPPLY

All equipment, raw materials and components are available in India. However, these could also be procured from other countries like UK, West Germany, Japan, USA, etc. Names of some of the equipment suppliers are given in the Annexure.

REQUIRED UTILITIES

Electric Power	: 20 KVA
Electricity consumption/month	: 2200 KWH

REQUIRED MANPOWER

Production Manager	: 1
Marketing Manager	: 1
Purchase Manager	: 1
Marketing/Purchase Assistant	: 7
Testing and Inspection Staff	: 5
Skilled Workers	: 15
Semi-skilled Workers	: 10
Unskilled Workers	: 5
Administration & Accounts	: 5
	50

..../4.

REQUIRED AREA FOR PLANT SITE

Building	: 500 sq.meters
Land	: 1000 sq.meters

PROCESS FLOW SHEET

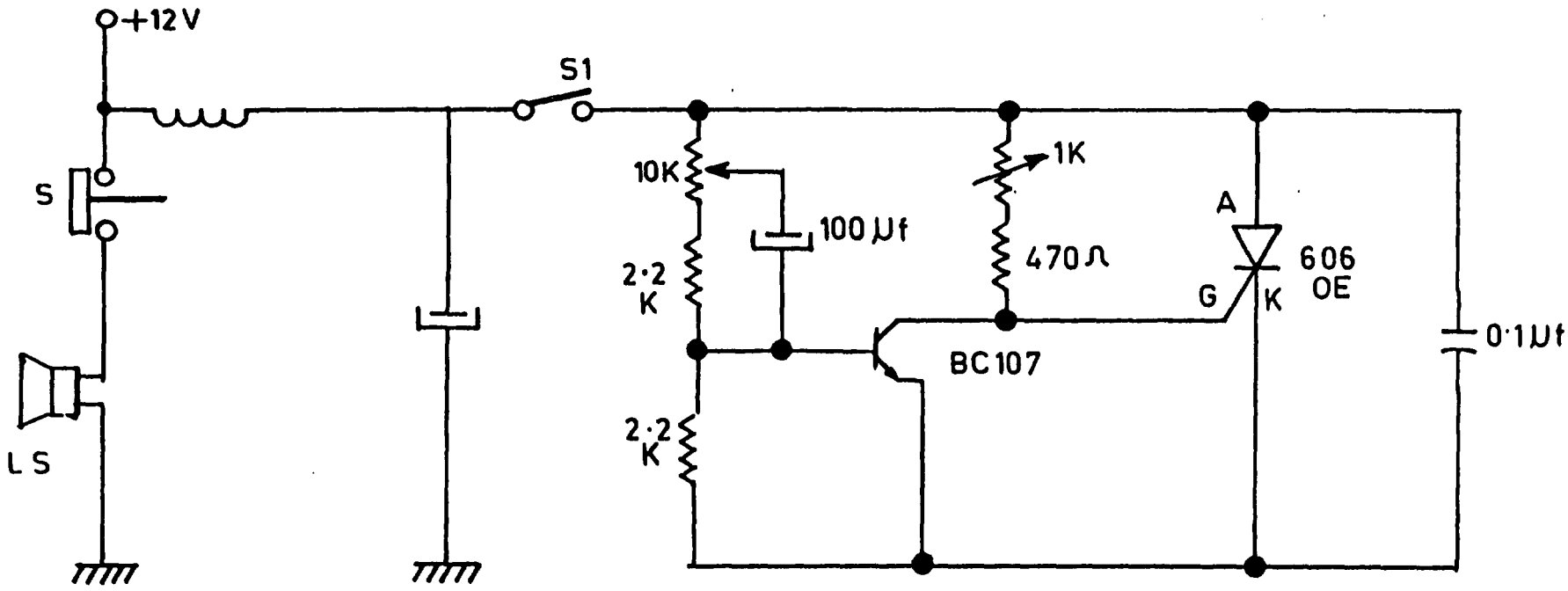
Process Flow is shown in Fig.2.

LOCATIONAL CONDITIONS

There are no special requirements for manufacture/assembly of intruder burglar alarms. They can be assembled in any moderately clean surroundings. Building should preferably be of RCC structure to minimise dust. Further, factory should be situated close to big cities where the item is likely to have greater demand.

DIVERSIFICATION PROGRAMME

Once the unit is fully operational, fire alarms can also be produced utilising almost the same production facilities and marketing network.



INTRUDER BURGLAR ALARM

FIG.1

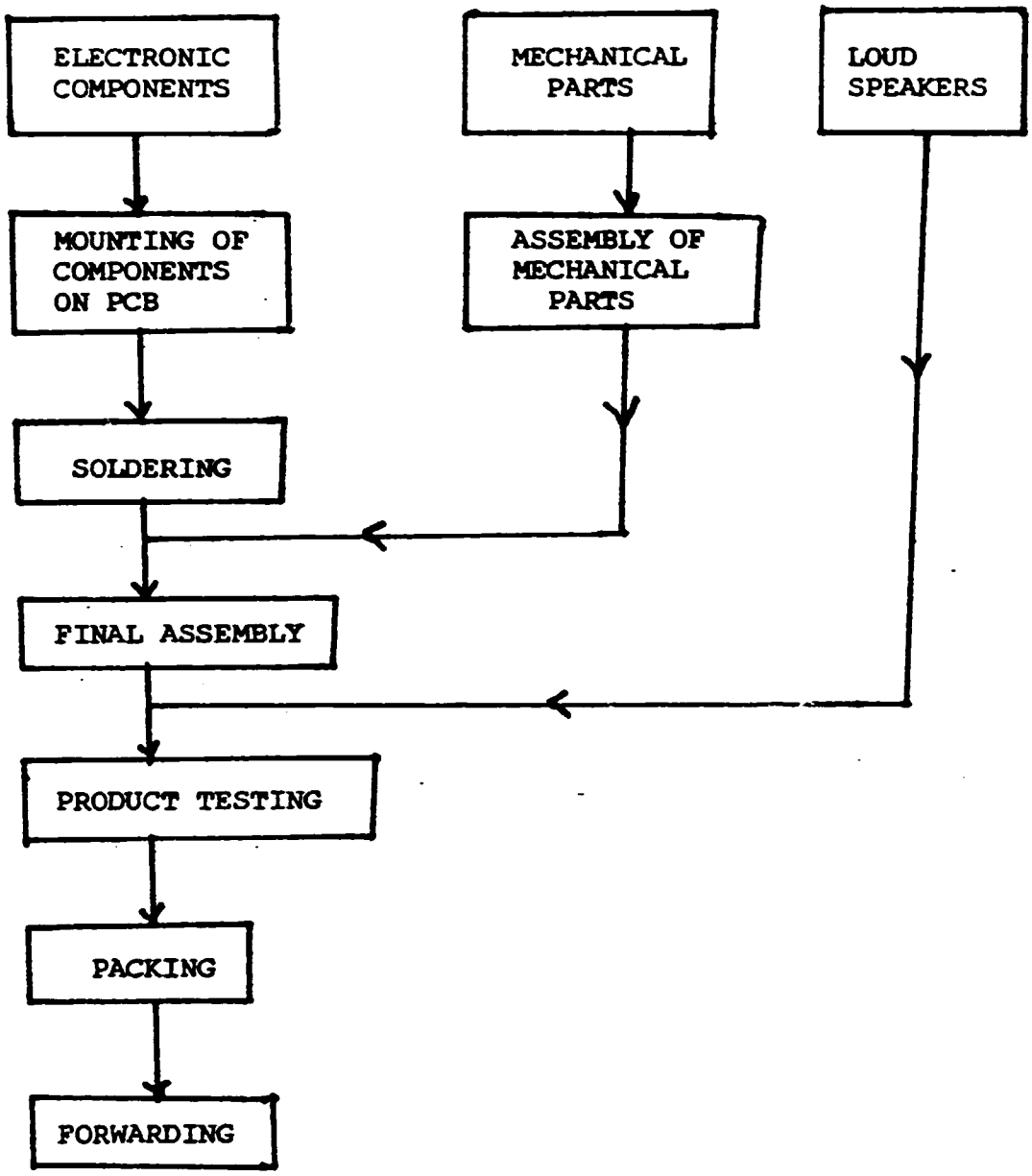

ELECTRONIC COMPONENTS
MECHANICAL PARTS
LOUD SPEAKERS
MOUNTING OF COMPONENTS ON PCB
ASSEMBLY OF MECHANICAL PARTS
SOLDERING
FINAL ASSEMBLY
PRODUCT TESTING
PACKING
FORWARDING

FIG.2

Annexure

INDIA

1. Applied Electronics Limited,
APLAB House
A-5 Wagle Indl.Estate
Thane-400 604
Maharashtra.

2. Hindustan Instruments Limited
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